METHODS OF RECORDING AND CODING INFORMATION pdf

1: Data compression - Wikipedia

The Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, hereafter referred to as the Guide, has been revised several times in the past.

Next, the general decoding method according to the present invention will be described in the context of the first embodiment. The various apparatuses according to the present invention will then be described. Specifically, the coding device, recording device, transmission device, decoding device, reproducing device and receiving device according to the present invention will be described. Afterwards, additional coding embodiments according to the present invention will be described. The code words are also divided into at least one state of a first kind and at least one state of a second kind. The code words satisfy a d, k constraint of 1, k , and are divided into 3 states of the first kind and 2 states of the second kind a total of 5 states. An enumeration of code words shows there are code words in subgroup E00, code words in subgroup E10, code words in subgroup E01, and 89 code words in subgroup E To perform encoding, each bit code word in each state is associated with a coding state direction. The state direction indicates the next state from which to select a code word in the encoding process. Furthermore, while, as explained in more detail below, the same code word can be assigned to different information words in the same state, different states cannot include the same code word. In particular code words in subgroups E10 and E00 can be assigned 5 times to different information words within one state, while code words in subgroups E11 and E01 can be assigned 3 times to different information words within one state. For m-bit information words, there are a total of 2m possible information words. The available code words in the various subgroups are distributed over the states of the first and second kind in compliance with the restrictions discussed above. As shown in FIG. Taking the subgroup E00 of size as an example, subgroup E00 has 76 code words in each of states 1, 2, and 3 plus 1 code word in each of states 4 and 5. In the manner described above any random series of 9-bit information words can be uniquely converted to a series of code words. Included in the translation table of FIGS. The third, fifth, seventh, ninth and eleventh columns show the code words also referred to in the art as channel bits assigned to the information words in states 1, 2, 3, 4 and 5, respectively. The fourth, sixth, eighth, tenth and twelfth columns show by way of the respective digits 1, 2, 3, 4 and 5 the state direction of the associated code words in the third, fifth, seventh, ninth and eleventh columns, respectively. The conversion of a series of information words into a series of code words will be further explained with reference to FIG. The first column of FIG. The first word from the series of information words shown in the first column of FIG. Let us assume that the coding state is state 1 S1 when the conversion of the series of information words is initiated. Decoding Method Hereinafter, decoding of n-bit code words in this example bit words received from a recording medium will be further explained with reference to FIGS. From the translation table of FIGS. In the same manner other code words can be decoded. It is noted that both the current code word and the next code words are observed to decode the current code word into a unique information word. The coding device converts m-bit information words into n-bit code words, where the number of different coding states r is represented by s bits. However, instead of a ROM, the converter 50 can include a combinatorial logic circuit producing the same results as the translation table according to at least one embodiment of the present invention. From the inputs of the converter 50, m inputs are connected to a first bus 51 for receiving m-bit information words. From the outputs of the converter 50, n outputs are connected to a second bus 52 for delivering n-bit code words. Furthermore, s inputs are connected to an s-bit third bus 53 for receiving a state word that indicates the instantaneous coding state. The state word is delivered by a buffer memory 54 including, for example, s flip-flops. The buffer memory 54 has s inputs connected to a fourth bus 55 for receiving a state direction to be loaded into the buffer memory 54 as the state word. For delivering the state directions to be loaded in the buffer memory 54, the s outputs of the converter 50 are used. The second bus 52 is connected to the parallel inputs of a parallel-to-serial converter 56, which converts the code words received over the second bus 52 to a serial bit string. A signal line 57 supplies the serial bit string to a modulator circuit 58, which converts the bit string into a modulated signal. The modulated signal is then delivered over a line The modulator circuit 58 is any well-known circuit for converting binary data into a modulated signal such as a modula-2 integrator. In operation, the converter 50 receives m-bit information words and an s-bit state word from the first bus 51 and the third bus 53, respectively. The s-bit state word indicates the state in the translation table to use in converting the m-bit information word. Accordingly, based on the value of the m-bit information word, the n-bit code word is determined from the code words in the state identified by the s-bit state word. Also, the state direction associated with the n-bit code word is determined. The state direction, namely, the value thereof is converted into an s-bit binary word; or alternatively, the state directions are stored in the translation table as s-bit binary words. The converter 50 outputs the n-bit code word on the second bus 52, and outputs the s-bit state direction on fourth bus The buffer memory 54 stores the s-bit state direction as a state word, and supplies the s-bit state word to the converter 50 over the third bus 53 in synchronization with the receipt of the next m-bit information word by the converter This synchronization is produced based on the clock signals discussed above in any well-known manner. The modulated signal may then undergo further processing for recordation or transmission. The modulated signal produced by the coding device is delivered to a control circuit The control circuit may be any conventional control circuit for controlling an optical pick-up or laser diode in response to the modulated signal applied to the control circuit so that a pattern of marks corresponding to the modulated signal are recorded on the recording medium The recording medium shown is a read-only memory ROM type optical disc. However, the recording medium of the present invention is not limited to a ROM type optical disk, but could be any type of optical disk such as a write-once read-many WORM optical disk, random accessible memory RAM optical disk, etc. Further, the recording medium is not limited to being an optical disk, but could be any type of recording medium such as a magnetic disk, a magneto-optical disk, a memory card, magnetic tape, etc. As shown, the track includes pit regions and non-pit regions Generally, the pit and non-pit regions and represent constant signal regions of the modulated signal zeros in the code words and the transitions between pit and non-pit regions represent logic state transitions in the modulated signal ones in the code words. As discussed above, the recording medium may be obtained by first generating the modulated signal and then recording the modulated signal on the recording medium Alternatively, if the recording medium is an optical disc, the recording medium can also be obtained with well-known mastering and replica techniques. A transmitter then further processes the modulated signal, to convert the modulated signal into a form for transmission depending on the communication system to which the transmitter belongs, and transmits the converted modulated signal over a transmission medium such as air or space , optical fiber, cable, a conductor, etc. The decoder performs the reverse process of the converter of FIG. The first and second LUTs and store the translation table used to create the n-bit code words being decoded. Accordingly, the decoder operates as a sliding block decoder. At every block time instant the decoder decodes one n-bit code word into one m-bit information word and proceeds with the next n-bit code word in the serial data also referred to as the channel bit stream. So the output of the first LUT is a binary number in the range of 1, 2,. The second LUT determines the possible m-bit information words associated with Kth code word from the Kth code word using the stored translation table, and then determines the specific one of the possible m-bit information words being represented by the n-bit code word using the state information from the first LUT and the stored translation table. For the purposes of further explanation only, assume the n-bit code words are bit code words produced using the translation table of FIGS. Then, referring to FIG. As shown, the reading device includes an optical pick-up of a conventional type for reading a recording medium according to the invention. The recording medium may be any type of recording medium such as discussed previously. The optical pick-up produces an analog read signal modulated according to the information pattern on the recording medium A detection circuit converts this read signal in conventional fashion into a binary signal of the form acceptable to the decoder The decoder decodes the binary signal to obtain the m-bit information words. As shown, the receiving device includes a receiver for receiving a signal transmitted over a medium such as air or space , optical fiber, cable, a conductor, etc. The receiver converts the received signal into a binary signal of the form acceptable to the decoder Also, the code words satisfy a d, k constraint of 1, k. Therefore, code words in subgroups E00 and E10 can be assigned 13 times to different information words, while code words in subgroups E01 and E11 can be assigned 8 times to different information words. The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention. A method of converting, comprising: US Method and apparatus for coding information, method and apparatus for decoding coded information, method of fabricating a recording medium, the recording medium and modulated signal Expired - Fee Related USB2 en Priority Applications 4.

METHODS OF RECORDING AND CODING INFORMATION pdf

2: Coding and Quality Reporting: Resolving the Discrepancies, Finding Opportunities

Content of Medical Records Incomplete Medical Records Ten Steps for Coding From Medical Records Testing Your Comprehension Coding Practice I: Chapter Review Exercises Coding Practice II: Medical Record Case Study Chapter Objectives. Identify common formats of the medical record.. Describe the basic steps taken to review a medical record for coding.

Overview[edit] Neurons are remarkable among the cells of the body in their ability to propagate signals rapidly over large distances. They do this by generating characteristic electrical pulses called action potentials: Sensory neurons change their activities by firing sequences of action potentials in various temporal patterns, with the presence of external sensory stimuli, such as light , sound , taste , smell and touch. It is known that information about the stimulus is encoded in this pattern of action potentials and transmitted into and around the brain. Although action potentials can vary somewhat in duration, amplitude and shape, they are typically treated as identical stereotyped events in neural coding studies. If the brief duration of an action potential about 1ms is ignored, an action potential sequence, or spike train, can be characterized simply by a series of all-or-none point events in time. In order to describe and analyze neuronal firing, statistical methods and methods of probability theory and stochastic point processes have been widely applied. With the development of large-scale neural recording and decoding technologies, researchers have begun to crack the neural code and have already provided the first glimpse into the real-time neural code as memory is formed and recalled in the hippocampus, a brain region known to be central for memory formation. Neural encoding refers to the map from stimulus to response. The main focus is to understand how neurons respond to a wide variety of stimuli, and to construct models that attempt to predict responses to other stimuli. Neural decoding refers to the reverse map, from response to stimulus, and the challenge is to reconstruct a stimulus, or certain aspects of that stimulus, from the spike sequences it evokes. They may be locked to an external stimulus such as in the visual [11] and auditory system or be generated intrinsically by the neural circuitry. In one theory, termed "neuroelectrodynamics", the following coding schemes are all considered to be epiphenomena, replaced instead by molecular changes reflecting the spatial distribution of electric fields within neurons as a result of the broad electromagnetic spectrum of action potentials, and manifested in information as spike directivity. Rate coding is sometimes called frequency coding. Rate coding is a traditional coding scheme, assuming that most, if not all, information about the stimulus is contained in the firing rate of the neuron. Because the sequence of action potentials generated by a given stimulus varies from trial to trial, neuronal responses are typically treated statistically or probabilistically. They may be characterized by firing rates, rather than as specific spike sequences. In most sensory systems, the firing rate increases, generally non-linearly, with increasing stimulus intensity. In fact, the term "firing rate" has a few different definitions, which refer to different averaging procedures, such as an average over time or an average over several repetitions of experiment. In rate coding, learning is based on activity-dependent synaptic weight modifications. As the weight of the stimulus increased, the number of spikes recorded from sensory nerves innervating the muscle also increased. From these original experiments, Adrian and Zotterman concluded that action potentials were unitary events, and that the frequency of events, and not individual event magnitude, was the basis for most inter-neuronal communication. In the following decades, measurement of firing rates became a standard tool for describing the properties of all types of sensory or cortical neurons, partly due to the relative ease of measuring rates experimentally. However, this approach neglects all the information possibly contained in the exact timing of the spikes. During recent years, more and more experimental evidence has suggested that a straightforward firing rate concept based on temporal averaging may be too simplistic to describe brain activity. The length T of the time window is set by the experimenter and depends on the type of neuron recorded from and to the stimulus. In practice, to get sensible averages, several spikes should occur within the time window. Temporal averaging can work well in cases where the stimulus is constant or slowly varying and does not require a fast reaction of the organism â€” and this is the situation usually encountered in experimental protocols. Real-world input, however, is hardly stationary, but often changing on a fast time scale. For example, even when viewing a static image, humans perform saccades , rapid changes of the direction of gaze. The image projected onto the retinal photoreceptors changes therefore every few hundred milliseconds. It has led to the idea that a neuron transforms information about a single input variable the stimulus strength into a single continuous output variable the firing rate. There is a growing body of evidence that in Purkinje neurons , at least, information is not simply encoded in firing but also in the timing and duration of non-firing, quiescent periods. Please help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. It works for stationary as well as for time-dependent stimuli. To experimentally measure the time-dependent firing rate, the experimenter records from a neuron while stimulating with some input sequence. The time t is measured with respect to the start of the stimulation sequence. As an experimental procedure, the time-dependent firing rate measure is a useful method to evaluate neuronal activity, in particular in the case of time-dependent stimuli. The obvious problem with this approach is that it can not be the coding scheme used by neurons in the brain. Neurons can not wait for the stimuli to repeatedly present in an exactly same manner before generating response. Nevertheless, the experimental time-dependent firing rate measure can make sense, if there are large populations of independent neurons that receive the same stimulus. Instead of recording from a population of N neurons in a single run, it is experimentally easier to record from a single neuron and average over N repeated runs. Thus, the time-dependent firing rate coding relies on the implicit assumption that there are always populations of neurons. Temporal coding[edit] When precise spike timing or high-frequency firing-rate fluctuations are found to carry information, the neural code is often identified as a temporal code. Rate coding models suggest that these irregularities are noise, while temporal coding models suggest that they encode information. If the nervous system only used rate codes to convey information, a more consistent, regular firing rate would have been evolutionarily advantageous, and neurons would have utilized this code over other less robust options. To model this idea, binary symbols can be used to mark the spikes: However, functions of the brain are more temporally precise than the use of only rate encoding seems to allow[citation needed]. In other words, essential information could be lost due to the inability of the rate code to capture all the available information of the spike train. In addition, responses are different enough between similar but not identical stimuli to suggest that the distinct patterns of spikes contain a higher volume of information than is possible to include in a rate code. For example, time to first spike after the stimulus onset, characteristics based on the second and higher statistical moments of the ISI probability distribution , spike randomness, or precisely timed groups of spikes temporal patterns are candidates for temporal codes. Stimuli that change rapidly tend to generate precisely timed spikes and rapidly changing firing rates no matter what neural coding strategy is being used. Temporal coding refers to temporal precision in the response that does not arise solely from the dynamics of the stimulus, but that nevertheless relates to properties of the stimulus. The interplay between stimulus and encoding dynamics makes the identification of a temporal code difficult. In temporal coding, learning can be explained by activity-dependent synaptic delay modifications. If each spike is independent of all the other spikes in the train, the temporal character of the neural code is determined by the behavior of time-dependent firing rate r t. If r t varies slowly with time, the code is typically called a rate code, and if it varies rapidly, the code is called temporal. Due to the density of information about the abbreviated stimulus contained in this single spike, it would seem that the timing of the spike itself would have to convey more information than simply the average frequency of action potentials over a given period of time. This model is especially important for sound localization , which occurs within the brain on the order of milliseconds. The brain must obtain a large quantity of information based on a relatively short neural response. Additionally, if low firing rates on the order of ten spikes per second must be distinguished from arbitrarily close rate coding for different stimuli, then a neuron trying to discriminate these two stimuli may need to wait for a second or more to accumulate enough information. This is not consistent with numerous organisms which are able to discriminate between stimuli in the time frame of milliseconds, suggesting that a rate code is not the only model at work. The main drawback of such a coding scheme is its sensitivity to intrinsic neuronal fluctuations. However, the interspike interval could be used to encode additional information, which is especially important when the spike rate reaches its limit, as in high-contrast situations. For this reason, temporal coding may play a part in coding defined edges rather than gradual transitions. The temporal component of the pattern elicited by each tastant may be used to determine its identity e. In this way, both rate coding and temporal coding may be used in the gustatory system â€” rate for basic tastant type, temporal for more specific differentiation. Groups of neurons may synchronize in response to a stimulus. In studies dealing with the front cortical portion of the brain in primates, precise patterns with short time scales only a few milliseconds in length were found across small populations of neurons which correlated with certain information processing behaviors. However, little information could be determined from the patterns; one possible theory is they represented the higher-order processing taking place in the brain. This strategy of using spike latency allows for rapid identification of and reaction to an odorant. Advances made in optogenetics allow neurologists to control spikes in individual neurons, offering electrical and spatial single-cell resolution. For example, blue light causes the light-gated ion channel channelrhodopsin to open, depolarizing the cell and producing a spike. When blue light is not sensed by the cell, the channel closes, and the neuron ceases to spike. The pattern of the spikes matches the pattern of the blue light stimuli. By inserting channelrhodopsin gene sequences into mouse DNA, researchers can control spikes and therefore certain behaviors of the mouse e. Regulation of spike intervals in single cells more precisely controls brain activity than the addition of pharmacological agents intravenously.

METHODS OF RECORDING AND CODING INFORMATION pdf

3: Qualitative Coding & Analysis | Research Rundowns

Medical records and health information technicians, commonly referred to as health information technicians, organize and manage health information data by ensuring that it maintains its quality, accuracy, accessibility, and security in both paper files and electronic systems. They use various classification systems to code and categorize patient information for insurance reimbursement purposes, for databases and registries, and to maintain patients' medical and treatment histories.

Audio codec and Audio coding format Audio data compression, not to be confused with dynamic range compression , has the potential to reduce the transmission bandwidth and storage requirements of audio data. Audio compression algorithms are implemented in software as audio codecs. Lossy audio compression algorithms provide higher compression at the cost of fidelity and are used in numerous audio applications. These algorithms almost all rely on psychoacoustics to eliminate or reduce fidelity of less audible sounds, thereby reducing the space required to store or transmit them. The acceptable trade-off between loss of audio quality and transmission or storage size depends upon the application. For example, one MB compact disc CD holds approximately one hour of uncompressed high fidelity music, less than 2 hours of music compressed losslessly, or 7 hours of music compressed in the MP3 format at a medium bit rate. A digital sound recorder can typically store around hours of clearly intelligible speech in MB. Lossless compression is unable to attain high compression ratios due to the complexity of waveforms and the rapid changes in sound forms. Many of these algorithms use convolution with the filter [-1 1] to slightly whiten or flatten the spectrum, thereby allowing traditional lossless compression to work more efficiently. The process is reversed upon decompression. When audio files are to be processed, either by further compression or for editing , it is desirable to work from an unchanged original uncompressed or losslessly compressed. Processing of a lossily compressed file for some purpose usually produces a final result inferior to the creation of the same compressed file from an uncompressed original. In addition to sound editing or mixing, lossless audio compression is often used for archival storage, or as master copies. A number of lossless audio compression formats exist. Shorten was an early lossless format. See list of lossless codecs for a complete listing. Some audio formats feature a combination of a lossy format and a lossless correction; this allows stripping the correction to easily obtain a lossy file. Other formats are associated with a distinct system, such as: The lossy spectrograms show bandlimiting of higher frequencies, a common technique associated with lossy audio compression. Lossy audio compression is used in a wide range of applications. In addition to the direct applications MP3 players or computers , digitally compressed audio streams are used in most video DVDs, digital television, streaming media on the internet , satellite and cable radio, and increasingly in terrestrial radio broadcasts. Lossy compression typically achieves far greater compression than lossless compression data of 5 percent to 20 percent of the original stream, rather than 50 percent to 60 percent , by discarding less-critical data. Most lossy compression reduces perceptual redundancy by first identifying perceptually irrelevant sounds, that is, sounds that are very hard to hear. Typical examples include high frequencies or sounds that occur at the same time as louder sounds. Those sounds are coded with decreased accuracy or not at all. Due to the nature of lossy algorithms, audio quality suffers when a file is decompressed and recompressed digital generation loss. This makes lossy compression unsuitable for storing the intermediate results in professional audio engineering applications, such as sound editing and multitrack recording. Coding methods[edit] To determine what information in an audio signal is perceptually irrelevant, most lossy compression algorithms use transforms such as the modified discrete cosine transform MDCT to convert time domain sampled waveforms into a transform domain. Once transformed, typically into the frequency domain , component frequencies can be allocated bits according to how audible they are. Audibility of spectral components calculated using the absolute threshold of hearing and the principles of simultaneous masking â€”the phenomenon wherein a signal is masked by another signal separated by frequencyâ€”and, in some cases, temporal masking â€”where a signal is masked by another signal separated by time. Equal-loudness contours may also be used to weight the perceptual importance of components. Models of the human ear-brain combination incorporating such effects are often called psychoacoustic models. LPC may be thought of as a basic perceptual coding technique: In such applications, the data must be decompressed as the data flows, rather than after the entire data stream has been transmitted. Not all audio codecs can be used for streaming applications, and for such applications a codec designed to stream data effectively will usually be chosen. Some codecs will analyze a longer segment of the data to optimize efficiency, and then code it in a manner that requires a larger segment of data at one time to decode. Often codecs create segments called a "frame" to create discrete data segments for encoding and decoding. The inherent latency of the coding algorithm can be critical; for example, when there is a two-way transmission of data, such as with a telephone conversation, significant delays may seriously degrade the perceived quality. In contrast to the speed of compression, which is proportional to the number of operations required by the algorithm, here latency refers to the number of samples that must be analysed before a block of audio is processed. In the minimum case, latency is zero samples e. Time domain algorithms such as LPC also often have low latencies, hence their popularity in speech coding for telephony. In algorithms such as MP3, however, a large number of samples have to be analyzed to implement a psychoacoustic model in the frequency domain, and latency is on the order of 23 ms 46 ms for two-way communication. Speech encoding[edit] Speech encoding is an important category of audio data compression. The perceptual models used to estimate what a human ear can hear are generally somewhat different from those used for music. The range of frequencies needed to convey the sounds of a human voice are normally far narrower than that needed for music, and the sound is normally less complex. As a result, speech can be encoded at high quality using a relatively low bit rate. If the data to be compressed is analog such as a voltage that varies with time , quantization is employed to digitize it into numbers normally integers. If the integers generated by quantization are 8 bits each, then the entire range of the analog signal is divided into intervals and all the signal values within an interval are quantized to the same number. If bit integers are generated, then the range of the analog signal is divided into 65, intervals. This relation illustrates the compromise between high resolution a large number of analog intervals and high compression small integers generated. This application of quantization is used by several speech compression methods. This is accomplished, in general, by some combination of two approaches: Only encoding sounds that could be made by a single human voice. Throwing away more of the data in the signalâ€"keeping just enough to reconstruct an "intelligible" voice rather than the full frequency range of human hearing. History[edit] Solidyne While there were some papers from before that time, this collection documented an entire variety of finished, working audio coders, nearly all of them using perceptual i. Twenty years later, almost all the radio stations in the world were using similar technology manufactured by a number of companies. Video coding format and Video codec Video compression is a practical implementation of source coding in information theory. In practice, most video codecs are used alongside audio compression techniques to store the separate but complementary data streams as one combined package using so-called container formats. Although lossless video compression codecs perform at a compression factor of 5 to 12, a typical MPEG-4 lossy compression video has a compression factor between 20 and Such data usually contains abundant amounts of spatial and temporal redundancy. Video compression algorithms attempt to reduce redundancy and store information more compactly. Most video compression formats and codecs exploit both spatial and temporal redundancy e. Similarities can be encoded by only storing differences between e. Inter-frame compression a temporal delta encoding is one of the most powerful compression techniques. It re uses data from one or more earlier or later frames in a sequence to describe the current frame. Intra-frame coding , on the other hand, uses only data from within the current frame, effectively being still- image compression. A class of specialized formats used in camcorders and video editing use less complex compression schemes that restrict their prediction techniques to intra-frame prediction. Usually video compression additionally employs lossy compression techniques like quantization that reduce aspects of the source data that are more or less irrelevant to the human visual perception by exploiting perceptual features of human vision. For example, small differences in color are more difficult to perceive than are changes in brightness. Compression algorithms can average a color across these similar areas to reduce space, in a manner similar to those used in JPEG image compression. Highly compressed video may present visible or distracting artifacts. Other methods than the prevalent DCT-based transform formats, such as fractal compression , matching pursuit and the use of a discrete wavelet transform DWT , have been the subject of some research, but are typically not used in practical products except for the use of wavelet coding as still-image coders without motion compensation. Interest in fractal compression seems to be waning, due to recent theoretical analysis showing a comparative lack of effectiveness of such methods. Individual frames of a video sequence are compared from one frame to the next, and the video compression codec sends only the differences to the reference frame. If the frame contains areas where nothing has moved, the system can simply issue a short command that copies that part of the previous frame into the next one. If sections of the frame move in a simple manner, the compressor can emit a slightly longer command that tells the decompressor to shift, rotate, lighten, or darken the copy. This longer command still remains much shorter than intraframe compression. Usually the encoder will also transmit a residue signal which describes the remaining more subtle differences to the reference imagery. Using entropy coding, these residue signals have a more compact representation than the full signal. In areas of video with more motion, the compression must encode more data to keep up with the larger number of pixels that are changing. Commonly during explosions, flames, flocks of animals, and in some panning shots, the high-frequency detail leads to quality decreases or to increases in the variable bitrate. Hybrid block-based transform formats[edit] Processing stages of a typical video encoder Today, nearly all commonly used video compression methods e. They mostly rely on the DCT, applied to rectangular blocks of neighboring pixels, and temporal prediction using motion vectors , as well as nowadays also an in-loop filtering step. In the prediction stage, various deduplication and difference-coding techniques are applied that help decorrelate data and describe new data based on already transmitted data. Then rectangular blocks of residue pixel data are transformed to the frequency domain to ease targeting irrelevant information in quantization and for some spatial redundancy reduction. The discrete cosine transform DCT that is widely used in this regard was introduced by N. In the last stage statistical redundancy gets largely eliminated by an entropy coder which often applies some form of arithmetic coding. In an additional in-loop filtering stage various filters can be applied to the reconstructed image signal. By computing these filters also inside the encoding loop they can help compression because they can be applied to reference material before it gets used in the prediction process and they can be guided using the original signal. The most popular example are deblocking filters that blur out blocking artefacts from quantization discontinuities at transform block boundaries. Entropy coding started in the s with the introduction of Shannonâ€”Fano coding [31] on which the widely used Huffman coding is based that was developed in ; [32] the more modern context-adaptive binary arithmetic coding CABAC was published in the early s. Compression of Genomic Re-Sequencing Data Genetics compression algorithms are the latest generation of lossless algorithms that compress data typically sequences of nucleotides using both conventional compression algorithms and genetic algorithms adapted to the specific datatype. In , a team of scientists from Johns Hopkins University published a genetic compression algorithm that does not use a reference genome for compression.

4: RWJF - Qualitative Research Guidelines Project | Observation | Observation

Coding is an established procedure that facilitates analyzing the video by identifying the tasks and interactions in the video. 19 A coding scheme classifies variables of interest in the video according to the purpose of the analysis, and it speeds up the coding process.

Next, the general decoding method according to the present invention will be described in the context of the first embodiment. The various apparatuses according to the present invention will then be described. Specifically, the coding device, recording device, transmission device, decoding device, reproducing device and receiving device according to the present invention will be described. Afterwards, additional coding embodiments according to the present invention will be described. The code words are also divided into at least one state of a first kind and at least one state of a second kind. The code words satisfy a d, k constraint of 1, k , and are divided into 3 states of the first kind and 2 states of the second kind a total of 5 states. An enumeration of code words shows there are code words in subgroup E00, code words in subgroup E10, code words in subgroup E01, and 89 code words in subgroup E To perform encoding, each bit code word in each state is associated with a coding state direction. The state direction indicates the next state from which to select a code word in the encoding process. Furthermore, while, as explained in more detail below, the same code word can be assigned to different information words in the same state, different states cannot include the same code word. In particular code words in subgroups E10 and E00 can be assigned 5 times to different information words within one state, while code words in subgroups E11 and E01 can be assigned 3 times to different information words within one state. For m-bit information words, there are a total of 2m possible information words. The available code words in the various subgroups are distributed over the states of the first and second kind in compliance with the restrictions discussed above. As shown in FIG. Taking the subgroup E00 of size as an example, subgroup E00 has 76 code words in each of states 1, 2, and 3 plus 1 code word in each of states 4 and 5. In the manner described above any random series of 9-bit information words can be uniquely converted to a series of code words. Included in the translation table of FIGS. The third, fifth, seventh, ninth and eleventh columns show the code words also referred to in the art as channel bits assigned to the information words in states 1, 2, 3, 4 and 5, respectively. The fourth, sixth, eighth, tenth and twelfth columns show by way of the respective digits 1, 2, 3, 4 and 5 the state direction of the associated code words in the third, fifth, seventh, ninth and eleventh columns, respectively. The conversion of a series of information words into a series of code words will be further explained with reference to FIG. The first column of FIG. Let us assume that the coding state is state 1 S1 when the conversion of the series of information words is initiated. Decoding Method Hereinafter, decoding of n-bit code words in this example bit words received from a recording medium will be further explained with reference to FIGS. From the translation table of FIGS. In the same manner other code words can be decoded. It is noted that both the current code word and the next code words are observed to decode the current code word into a unique information word. The coding device converts m-bit information words into n-bit code words, where the number of different coding states r is represented by s bits. However, instead of a ROM, the converter 50 can include a combinatorial logic circuit producing the same results as the translation table according to at least one embodiment of the present invention. From the inputs of the converter 50, m inputs are connected to a first bus 51 for receiving m-bit information words. From the outputs of the converter 50, n outputs are connected to a second bus 52 for delivering n-bit code words. Furthermore, s inputs are connected to an s-bit third bus 53 for receiving a state word that indicates the instantaneous coding state. The state word is delivered by a buffer memory 54 including, for example, s flip-flops. The buffer memory 54 has s inputs connected to a fourth bus 55 for receiving a state direction to be loaded into the buffer memory 54 as the state word. For delivering the state directions to be loaded in the buffer memory 54, the s outputs of the converter 50 are used. The second bus 52 is connected to the parallel inputs of a parallel-to-serial converter 56, which converts the code words received over the second bus 52 to a serial bit string. A signal line 57 supplies the serial bit string to a modulator circuit 58, which converts the bit string into a modulated signal. The modulated signal is then delivered over a line

The modulator circuit 58 is any well-known circuit for converting binary data into a modulated signal such as a modula-2 integrator. In operation, the converter 50 receives m-bit information words and an s-bit state word from the first bus 51 and the third bus 53, respectively. The s-bit state word indicates the state in the translation table to use in converting the m-bit information word. Accordingly, based on the value of the m-bit information word, the n-bit code word is determined from the code words in the state identified by the s-bit state word. Also, the state direction associated with the n-bit code word is determined. The state direction, namely, the value thereof is converted into an s-bit binary word; or alternatively, the state directions are stored in the translation table as s-bit binary words. The converter 50 outputs the n-bit code word on the second bus 52, and outputs the s-bit state direction on fourth bus The buffer memory 54 stores the s-bit state direction as a state word, and supplies the s-bit state word to the converter 50 over the third bus 53 in synchronization with the receipt of the next m-bit information word by the converter This synchronization is produced based on the clock signals discussed above in any well-known manner. The modulated signal may then undergo further processing for recordation or transmission. The modulated signal produced by the coding device is delivered to a control circuit The control circuit may be any conventional control circuit for controlling an optical pick-up or laser diode in response to the modulated signal applied to the control circuit so that a pattern of marks corresponding to the modulated signal are recorded on the recording medium The recording medium shown is a read-only memory ROM type optical disc. However, the recording medium of the present invention is not limited to a ROM type optical disk, but could be any type of optical disk such as a write-once read-many WORM optical disk, random accessible memory RAM optical disk, etc. Further, the recording medium is not limited to being an optical disk, but could be any type of recording medium such as a magnetic disk, a magneto-optical disk, a memory card, magnetic tape, etc. As shown, the track includes pit regions and non-pit regions Generally, the pit and non-pit regions and represent constant signal regions of the modulated signal zeros in the code words and the transitions between pit and non-pit regions represent logic state transitions in the modulated signal ones in the code words. As discussed above, the recording medium may be obtained by first generating the modulated signal and then recording the modulated signal on the recording medium Alternatively, if the recording medium is an optical disc, the recording medium can also be obtained with well-known mastering and replica techniques. A transmitter then further processes the modulated signal, to convert the modulated signal into a form for transmission depending on the communication system to which the transmitter belongs, and transmits the converted modulated signal over a transmission medium such as air or space , optical fiber, cable, a conductor, etc. The decoder performs the reverse process of the converter of FIG. The first and second LUTs and store the translation table used to create the n-bit code words being decoded. Accordingly, the decoder operates as a sliding block decoder. At every block time instant the decoder decodes one n-bit code word into one m-bit information word and proceeds with the next n-bit code word in the serial data also referred to as the channel bit stream. So the output of the first LUT is a binary number in the range of 1, 2,. The second LUT determines the possible m-bit information words associated with Kth code word from the Kth code word using the stored translation table, and then determines the specific one of the possible m-bit information words being represented by the n-bit code word using the state information from the first LUT and the stored translation table. For the purposes of further explanation only, assume the n-bit code words are bit code words produced using the translation table of FIGS. Then, referring to FIG. As shown, the reading device includes an optical pick-up of a conventional type for reading a recording medium according to the invention. The recording medium may be any type of recording medium such as discussed previously. The optical pick-up produces an analog read signal modulated according to the information pattern on the recording medium A detection circuit converts this read signal in conventional fashion into a binary signal of the form acceptable to the decoder The decoder decodes the binary signal to obtain the m-bit information words. As shown, the receiving device includes a receiver for receiving a signal transmitted over a medium such as air or space , optical fiber, cable, a conductor, etc. The receiver converts the received signal into a binary signal of the form acceptable to the decoder Also, the code words satisfy a d, k constraint of 1, k. Therefore, code words in subgroups E00 and E10 can be assigned 13 times to different information words, while code words in subgroups E01 and E11 can be assigned 8 times to different information words. The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention. A method of converting, comprising: The method of claim 1 , wherein a minimum number of zeros d between consecutive ones in the n-bit code words is one zero. The method of claim 1 , wherein the n-bit code words of the first type end in zero, and the n-bit code words of the second type end in one. The method of claim 1 , wherein the n-bit code words in a coding state of the first kind start with zero, and the n-bit code words in a coding state of the second kind start with zero or one. The method of claim 1 , wherein the converting step converts the m-bit information words into n-bit code words that satisfy a d,k constraint, where d indicates a minimum number of zeros between consecutive ones of the n-bit code words and k indicates a maximum number of zeros between one of the n-bit code words, where d is 1. The method of claim 1 , wherein the n-bit code words are divided into p coding states of the first kind and q coding states of the second kind, where p and q are integers greater than or equal to 1, and each of the p and q coding states have n-bit code words different from the n-bit code words in the other p and q coding states.

5: Coding Systems, Codes in categorising and processing transactions

The coding device and method are employed to record information on a recording medium and thus create the recording medium. The coding device and method are further employed to transmit information. In the decoding method and apparatus, n-bit code words are decoded into m-bit information words.

There are many ways to accomplish both actions. This approach assumes you are using interview data. For a more detailed treatment of these and related analysis concepts, click here. In other words, you are breaking down the data into first level concepts, or master headings, and second-level categories, or subheadings. Researchers often use highlights to distinguish concepts and categories. For example, if interviewees consistently talk about teaching methods, each time an interviewee mentions teaching methods, or something related to a teaching method, you would use the same color highlight. Teaching methods would become a concept, and other things related types, etc. Use different colored highlights to distinguish each broad concept and category. What you should have at the end of this stage are transcripts with different colors in lots of highlighted text. Transfer these into a brief outline, with concepts being main headings and categories being subheadings. Axial coding In open coding, you were focused primarily on the text to define concepts and categories. In axial coding, you are using your concepts and categories while re-reading the text to 1. Confirm that your concepts and categories accurately represent interview responses and, 2. Explore how your concepts and categories are related. To examine the latter, you might ask, What conditions caused or influenced concepts and categories? Create a table Transfer final concepts and categories into a data table, such as this one Aulls, Note how the researcher listed the major categories, then explained them after the table. Here is an excellent comprehensive guide think desk reference to creating data displays for qualitative research. This appears to be a quick process, but it should not be. After you are satisfied with your coding procedures, I suggest submitting your table to an expert for review, or perhaps even one of the participants if interviewing to promote validity.

6: Neural coding - Wikipedia

Coding for recording and recall of information A meta-message that specifies the content of the message to which it refers is still content-independent as a meta-message. The relation between it, the message it refers to and the topic that the primary message is about is the way content-dependence is specified.

Coding and Quality Reporting: Resolving the Discrepancies, Finding Opportunities by Nelly Leon-Chisen, RHIA National quality-of-care and public reporting initiatives are creating new challenges and new opportunities for coding professionals. Quality medical coding has always been important. Coded data are used for many essential functions including reimbursement, benchmarking, clinical and financial decision making, healthcare policy, public health tracking, and research. Recently, medical coding has taken on increased importance as it relates to issues of quality of care and publicly reported data. There are many challenges associated with this increased importance, including new collection and reporting responsibilities and discrepancies between established coding guidelines and the requirements of varying quality measurement specifications. The expectations for coding professionals are likely to increase in years to come. Coding professionals will need to engage physicians and other healthcare professionals to work together to improve the accuracy of coded data to meet these new demands. Discrepancies between Coding Guidelines and Quality Measures Most quality or safety reporting is based on data originally collected for clinical and administrative needs. There is no formal process or system, and to date it has been a matter of adapting existing processes created for other purposes. Using existing coding structures is easiest and less burdensome, but there are challenges associated with using coded data to address quality. There are also opportunities. Retrospective chart abstraction is burdensome, time-consuming, and for the most part a manual process. However, a review of the entire medical record allows the opportunity to collect more specific clinical measures, especially for information that is not readily coded with the existing coding systems e. The development of data content standards will allow digital abstraction of these clinical data when the quality measure requires more granular clinical data than provided by administrative code sets. Administrative claims data are more efficient and involve a single review of the record and assignment of codes as part of the administrative process. In this manner, quality reporting becomes a by-product of the administrative process and does not require additional reviews. There are also some concerns about the accuracy or consistency of claims data. Case selection is not entirely sensitive to coding guidelines, and in some situations it may not be appropriate. The clinical classification system was not specifically designed for the purpose of collecting quality or patient safety outcomes, so it may not capture all the nuances of each individual case. Either the coding guidelines or the quality measures may require revision. Promoting Communication, Looking for Guidance Communication between the HIM and quality management departments may not be sufficient to resolve these types of issues, but it will go a long way in determining where the potential flaws in the system exist and point to where remediation may be found. Consider the problem of a facility admitting a heart failure patient for a heart transplant. The quality measure regarding heart failure requires that the patient be discharged on an angiotensin receptor blocker or angiotensin converting enzyme ACE inhibitor. However, a successful heart transplant patient would not require these medications. After discussions with the organization responsible for establishing the quality standard, the measure specification was modified to exclude patients with heart transplant from the denominator. This collaborative group has a tradition of dealing with difficult coding questions and providing advice that standardizes coded data and ensures as much consistency as possible. In recent years, emerging issues have been addressed with more focus on quality and patient safety issues, as well as the need for further refinement or specificity for severity reporting. This helps address the issues surrounding the discrepancies between coding guidelines and quality measures. Guidelines for the new present on admission indicator were introduced last year to provide a national standard for the reporting of this important new piece of data. The guidelines were developed in anticipation of the need for additional specificity, especially with the potential implications of the Deficit Reducation Act requirement regarding hospital-acquired conditions. In addition, specific guidance has been published in Coding Clinic on topics submitted by readers on questions related to patient safety, severity of illness, and quality of care. These examples include fluid overload due to noncompliance with dialysis versus congestive heart failure, ventilator-associated pneumonia, complication of medical care versus surgical misadventure, and hypoxemia with pneumonia or respiratory failure. National Initiatives Affecting Coding Major national initiatives related to quality of care and public reporting are already having an impact on the strategic importance of coding. Meeting the data needs of these programs brings new challenges, expectations, and opportunities for coding professionals. Public Reporting Public reporting is a driving force. Many initiatives are emerging to evaluate and report quality of care and patient safety. Some of these initiatives rely directly on administrative claims data, while others use data derived from detailed clinical documentation in which case-coded data may still play a role in appropriate case sampling and selection. Reported data serve four common interconnected purposes: The pressure for publicly reported data originates from diverse sources such as employers, health plans, and consumers. All of these groups are interested in reducing costs and improving clinical quality. However, their interest in publicly available data, or in making their own data available to the public, may vary. Pay-for-Performance Pay-for-performance programs are rapidly expanding. These programs generally consist of a differential payment to hospitals and other providers based on the performance of a set of specified measures. These measures may relate to quality of patient care, clinical outcomes, efficiency, patient satisfaction, or structural reforms such as implementation of information technology. These pay-for-performance programs align financial incentives with the delivery of high-quality care. Most include process and structure measures. Some include condition-specific clinical outcome measures, but process measures are easiest to identify because processes actually get coded. CMS has launched various initiatives to encourage improved quality of patient care in different healthcare settings such as hospitals, physician offices, nursing homes, home healthcare agencies, and dialysis facilities. CMS is using quality reporting programs to dramatically affect hospital and ambulatory care. For example, the Hospital Quality Alliance HQA is a public-private collaboration to improve the quality of hospital care by measuring and publicly reporting on that care. The HQA measure set currently consists of 21 measures. CMS links voluntary reporting of these measures to payment. Currently, 98 percent of eligible hospitals participate in the program. In the recently published fiscal year proposed rule for inpatient prospective payment system changes, CMS outlines the requirement for hospitals to start reporting the present on admission indicator. It also outlines the proposed conditions CMS is considering as the first set of hospital-acquired conditions to meet the DRA requirement. The proposed conditions range from catheter-associated urinary tract infections, ventilator-associated pneumonia, and decubitus ulcers to serious preventable events such as objects left in surgery and air emboli. All of the proposed conditions had to be evaluated in terms of specific criteria such as: The disconnect between responsibility and authority is problematic. Physicians have authority to document the care provided; hospitals and other professionals are held responsible for documentation that supports code assignment. New initiatives to improve performance metrics are attempting to bridge the gap and align physician and hospital performance improvement metrics. The big challenge for HIM professionals involves how to engage physicians. Coding professionals have always relied on physician documentation for code assignment. Nurses and other clinical personnel involved in quality management activities may not have the same constraints when assessing data for quality measurement, and they may not understand that official coding guidelines preclude the assignment of codes to complications that are inferred and not explicitly stated in the medical record. There has been growing tension between coding professionals and quality management professionals in the inpatient setting. In some institutions, HIM professionals work in the quality management department and can bridge the gap to provide the support needed in coding and documentation issues. Other facilities are not organized in this manner and require close communication between these two departments to relieve the perceived tension. Non-HIM professionals, such as quality management staff, nurses, or physicians, may not be aware of coding requirements that have a negative impact on quality measurement results. For example, a patient admitted for treatment of pulmonary congestion due to fluid overload from noncompliance with dialysis regimen must be assigned a principal diagnosis of congestive heart failure. In return, this case is flagged as failing the congestive heart failure Core Measures for the National Patient Safety Goal because the patient was not treated with ACE inhibitors. The treatment for fluid overload in patients in end-stage renal disease is dialysis, not ACE inhibitors. This discrepancy between coding guidelines and quality measures causes potential tension between the two departments. By the same token, coding professionals may not be aware of the quality measures that the hospital reports. The situation requires a team approach with the ultimate goal of providing the best possible patient care. Dialogues between coding professionals and quality management professionals should occur regularly to understand the constraints and needs of both systems. Physicians should be engaged in the process. Identifying Physician Champions These dialogues benefit from first identifying physician champions within the facility. HIM professionals can ask for their assistance and request that they provide education to the HIM department. Once the dialogue is initiated, coding professionals can share information regarding documentation gaps and the challenges they face when trying to clarify documentation with physicians. An honest exchange of information is likely to benefit both coding professionals and physicians. Physicians are more likely to be motivated when the encouragement for improved documentation originates from a peer rather than a coding professional. Physician champions may be of assistance in this regard. Voluntary reporting on quality measures is being implemented for physician offices as well. As physicians become more involved in reporting quality measures for their own services, they are likely to take a more active interest in the documentation and quality reporting requirements for hospitals. Data and information specialists are taking center stage. Electronic records, clinical decision support, and quality monitoring all equate to job security for strong HIM professionals because they are positioned right in the middle, between physicians and other patient care professionals and the systems collecting and processing clinical data. The future will create new, increased expectations for HIM professionals because they are strategically positioned to understand how information is created and used. HIM professionals already know the rules and guidelines governing administrative code sets, while the rest of the care team may need additional training and guidance on information architecture. HIM will be at the center of every major delivery change in the coming decades. Nelly Leon-Chisen nleon aha.

7: Evaluation and Management Documentation and Coding Technology Adoption

This chapter looks at how coding systems can be devised and used in accounting systems. The use of codes in categorising and processing transactions It is universal practice in accounting systems to use coding systems to refer to customers, suppliers, accounts and employees.

Introduction Perhaps the earliest use of technology in qualitative research was when researchers first used tape recorders in their field studies to record interview sessions. In one sense this was clearly an easier way for researchers to keep a record of events and conversations, but it had two unforeseen consequences. First, it began to shift the effort of work in making a record of sessions from the researcher who traditionally took handwritten notes to others, such as secretaries and audio typists. This separation had an impact not only on how close to or distant from the data the researcher could remain, but also on the relationship between the data and the emerging analytic ideas of the researcher. Having a recording and a transcript meant that new ways of thinking about how the analysis developed out of the data and how the analysis was supported by the data became possible. Second, it allowed different kinds of analysis that could only be undertaken if accurate records of the speech were kept. This made possible a focus on the small scale and minute content and characteristics of speech. It also opened up the possibilities of much larger scale studies and the use of multiple researchers and analysts. In the 21st century, the use of new technology still raises issues like what should be analysed, how it should be analysed and in what ways the knowledge and understanding gained are different and more or less well founded than those gained in more traditional ways. The papers in this issue address both these impacts of the technology: Most researchers recognise that in most cases, the use of new technology usually affects both. Data Gathering Audio recording is an analogue technology, as are film and traditional video. There is a long history of their use in many areas of social and psychological research and especially in anthropology. Recent changes in this technology have taken several forms. First it has become cheaper and more widespread. This means that the technology is more available to researchers, but also that the people being researched are more used to being recorded by the technology and even familiar with using it themselves. For example, in the case of video, people are now used to being recorded whether as part of a "holiday video" or as part of the now widespread CCTV Closed Circuit Television security systems. They are often familiar with making their own video recordings and with "reading" the wide variety of video material they are presented with. Both the cheapness and ubiquity of the technology mean that there are new opportunities for researchers not only to record settings but also to use the technology to create new data. Naturally, the use of such technology raises issues of interpretation, impact and validity that researchers need to deal with. However, she found that they very quickly ignored the pictures and started more general discussions about their work practices. Consequently, she used printed versions of the photos as the basis of a group discussion amongst the researchers. Interaction patterns in task-oriented small groups discuss the use of the video analysis software, THEME, to identify communicative patterns in two distinct examples of task-oriented small group interaction. They focused on power-related and support-related behaviour as well as verbal and nonverbal patterns in the behaviour. With the software they found two interaction patterns that it would have been hard to detect without the use of the software: Not only has this made the technology cheaper and more widely used, but also it has made possible new ways of manipulating and analysing the data collected. This can be seen particularly in digital video where there is now some excellent software that can be used to display, examine and edit digital video recording in ways that are much easier and cheaper than non-digital video. The software makes it possible to rearrange, present, and navigate through video in ways that were not possible before. Whereas previously research involved the arduous creation of written sequence narratives, now using the software, the researcher could select video clips of only those behaviours of interest and quickly inspect the relevant behaviours and come to analytical conclusions. The former include discussion lists, text forums, personal Web pages and videoconferences. The latter include usage logs, text content logs as well as digitised recordings. As they point out, one key advantage here is that there is no need for transcription. Moreover, the e-interview might enable research about new social groupings, given that constraints of time, travel and financial resources do not apply. However, problems of how to establish and preserve rapport are created and the authors explore the issues that arise from the physical remoteness between interviewer and interviewee and the absence of cues and tacit signs provided by body language. As they point out, researchers need to be aware of the speed at which they should reply and at which they can expect replies from respondents. However, given the necessarily extended duration of e-interviews, there is no reason why several respondents cannot be interviewed at the same time. At the moment too, as they point out, researchers need to be aware of the biased samples that might result from surveying only those with good e-mail access. She employed a free association interview method adapted from psychoanalytic therapy and communicated with respondents using e-mail. Despite dealing with highly personal and emotionally charged topics, she found that compared with her earlier, face-to-face interviews, there was a lack of inhibition and rapport was easily established. However, she did note some gender differences. Women generally gave quicker and more emotionally detailed responses. Some authors have pointed to the anonymous and disembodied nature of electronic communication, however, HOLGE-HAZELTON found that her respondents often overcame that by the mutual exchange of personal and demographic details including pictures of themselves. Computer-based Transcription of Videoconference in this issue, discuss the parallel questions that arise when applying a conversational approach to videoconferences. In particular, they point out that conventional forms of transcription fail to take into account the issue of time delays between sites and the visual information that is also exchanged. For that reason, they suggest, current multimedia transcription approaches need to be modified to take into account the specifics of videoconference data and to make them accessible to qualitative data analysis. They suggest a computer-mediated process of transcription can be used. They suggest that computer mediated interaction should be considered as neither oral nor written language, but as a post-literate transformation of language itself. In particular they suggest that this transformation can only be properly studied using qualitative methodologies. They examine this in the context of an online educational environment and conclude that online discourse is significantly different from others in terms of temporality, the influence of community and reflexivity. For them, online discourses allow modes of communications that foster learning in ways that cannot be done in face-to-face environments. Computer Assisted Qualitative Data Analysis CAQDAS It is clear that the introduction of new technology has both expanded the ways in which qualitative researchers can collect data and also the settings and situations from which data can be collected. The other major impact of technology on qualitative work discussed in this issue has been on how the analysis is done. It is the common experience of researchers carrying out qualitative analysis that such work requires careful and complex management of large amounts of texts, codes, memos, notes and so on. The prerequisite of really effective qualitative analysis, it could be said, is efficient, consistent and systematic data management. The early programs focussed on data management and those most available now provide considerable assistance in these activities. The use of such text retriever and textbase manager programs, and related facilities such as simple searching in CAQDAS, is relatively uncontentious. In fact many of these aspects of data management do not need dedicated CAQDAS and much can be achieved with the use of other commonly available software such as word processors and databases. An analysis according to data attributes or variables like age, gender, profession, etc. There is a clear advantage in that the software is widely available and most of its functions are familiar to qualitative researchers. The paper describes the process of entering data into Access and explains how to set-up and manage code lists and undertake data retrieval. This is particularly the case when undertaking initial, broad-brush examination of the data and when generating simple counts. And qualitative analysts do seem to want to go further. This argument has been increasingly reinforced by the development, over time, of new program features. The second generation of CAQDAS, for example, introduced facilities for coding text and for manipulating, searching and reporting on the text thus coded. Such code and retrieve software is now at the heart of the most commonly used programs and has extended the use of the software into areas much closer to the analytic heart of qualitative research. In so doing it has brought to the fore contested issues about how far the software can actually assist with analysis rather than just with data management. For example, there are those who remain sceptical about the use of software for the more analytic aspects of qualitative research. The mechanical aspects refers to all the activities that underpin qualitative data analysis, such as marking up selected text with codes, generating reports, searching the text for key terms, usages and so on. These can be time consuming, tedious and error prone and it is these tasks that the computer can assist well with. However, the conceptual aspects of analysis, that include reading the text, interpreting it, creating coding schemes and identifying fruitful searches and reports, need a human and cannot be done by machine, he suggests. They assist with analytic procedures by providing a variety of facilities to help the analyst examine features and relationships in the texts. Such programs are often referred to as theory builders or model builders, not because on their own they can build theory, but because they contain various tools that assist researchers to develop theoretical ideas and test hypotheses. Some programs have also extended the forms of work supported beyond the lone researcher examining plain text. For instance, some support rich text, diagrams and the incorporation of images, movies and other multimedia data. Others have facilities that enable the exchange of data and analyses between researchers working together collaboratively. Some papers in this issue examine the new possibilities here. Their method, the holistic processing of complexity GABEK based on the philosophical concept of comprehension and explanation, is designed to cope with the large, diverse and often controversial data created in areas such as conflict studies, organisations, innovation studies and sociology. The approach is multi-stage. After initial coding, data are assessed, rated and organised into a conceptual structure, i. Furthermore, causal assumptions can be examined in the form of a complex cause-effect graph that facilitates the analysis of controversial issues and fosters comparative analyses. There are several questions about how audio, video and text data integrated together may be collected and analysed and the paper examines these. It also discusses the impact on computer-assisted analysis of such "multimedia" data and suggests that special methods of transcription may limit the analytic approach. There is therefore a need for new ways of approaching the analysis of such data. IRION suggests the application of modular software tools and illustrates his proposal with an example. Resistances and Possibilities discusses how the software can be used to underpin analysis by teams. In particular he discusses how the use of CAQDAS can be fully integrated into the research process and how this integration can support collaborative teamwork and allow the exploration of analytic dimensions that would be difficult to explore in other ways. The latter allowed separately created computer based analyses to be merged together. He suggests this is best done using an analysis based on broad themes that can be agreed and exchanged using the software facilities amongst a team. Whilst this may loose some of the depth and specificity of the phenomena studied, BOURDON argues that it allows better exploration of differences between cases and facilitates the examination of multiple perspectives of the research team. They examine some of the issues researchers need to consider when selecting software and the analytic approach they are going to take. They also discuss some of the support facilities available to those new to the software, such as training courses and on-line discussion lists. He identifies many of the misconceptions that learners have about the software, for example, that it will do the analysis for them and that they will learn about qualitative data analysis by learning the software. He argues for an approach to training that focuses initially on the aspects of qualitative analysis that researchers need to understand before they use the software, and that then examines several different programs. When starting to use the software, he suggests it is very important that learners should be able to analyse their own data set, as it is easier for them to understand how the research questions that arise from it can be addressed when using the software. Concerns about the limitations of CAQDAS and its impact on the kinds of analysis that can be undertaken and their quality are reflected in several of the papers in this issue. Amongst the issues they identify is a feeling of being distant from the data. Researchers using paper-based analysis felt they were closer to the words of their respondents or to their field notes than if they used computers. It was certainly true that some of the early software made it hard to track back from extracted text to the context in the original documents from which it came. But most programs now emphasise their facilities for the recontextualisation of data.

8: Behavioral Recording Types and how to do it

Our coding process will thus enable us to show the richness, complexities and contradictions of the social milieu we are evaluating, which is the basis of qualitative methods.

Gamm, PhD Introduction The adoption of information technology in healthcare is anticipated not only to improve the delivery of patient care, but also to revolutionize the way healthcare is organized. A recent report suggested a conceptual model of health information technology adoption with four main influences: Specifically, the relationship of the use of documentation and coding technology to possible financial incentives, practice or organizational factors, and regulatory issues will be discussed. The article concludes with suggestions and implications for future information technology use for evaluation and management coding. Administrative code sets are used by a wide variety of healthcare entities for many purposes, including reimbursing providers, setting budgets, measuring the quality of care, making actuarial predictions, and determining healthcare policy. Coding, the process by which an administrative numerical identifier is assigned to clinical documentation provided by a healthcare practitioner, does not appear to have changed much since the late s. However, the adoption of the electronic health record EHR and supporting health information technology may result in new methods. Several surveys and studies examine the adoption of health information technology in physician practices and medical groups. The findings of these studies are consistent. Larger practices are adopting EHR technologies more quickly than smaller practices. Financial considerations include the cost of the technology and a return on the investment, as well as lost productivity during implementation and additional ongoing costs for system maintenance. Organizational considerations include a lack of administrative and clinician support, along with doubts about their ability to select the best EHR system, a lack of user skills with the EHR, and security and privacy concerns. Gans and colleagues reported, based on a national survey of medical group practices, that improved accuracy for coding evaluation and management procedures was the third most important anticipated benefit, 4. As noted previously, coding of clinical data and documentation is used for myriad purposes, including quality reporting and pay-for-performance reporting, not to mention reimbursement. While many studies do ask about clinical documentation technology use, no studies of EHR or CPR adoption were found that include code assignment technology in their list of EHR technologies to be adopted. Given the Institute for Health Policy model, it is hypothesized that the adoption of documentation technology will be approximately equal to the adoption of coding technology. Additionally, this technology would not impose an additional burden on the provider since the code assignment is automated once the clinical documentation has occurred. Further, there is some evidence that practices using automated coding technology receive higher reimbursement. Thus, if a practice has adopted documentation technology, there appear to be financial incentives for the adoption of coding technology. The adoption of documentation and coding technology is also expected to be related to organizational or practice characteristics as discussed in previous studies, with larger practices and those associated with health systems adopting more technology due to the availability of greater resources. Given the exploratory nature of the survey, the full effect of the legal and regulatory factors is not addressed here. The relevance of one regulatory factor, the required compliance with two sets of documentation guidelines promulgated by Medicare, was captured and will be analyzed. One study looked at differences in inter-rater agreement rates between the two sets of documentation guidelines, but did not examine the extent of use of the different sets of guidelines or their effect on the adoption of technology. Results More physician practices use the traditional documentation and coding methods than use automated methods. Overall, the use of documentation and coding technology remains low. Almost 51 percent As the level of documentation technology used increases from traditional handwriting and dictation to the use of hard copy and computerized templates to the use of an EHR, the rate of adoption declines. The lowest usage rates are associated with computerized technologies. The first analysis focuses on relationships between the use of documentation and coding technology and physician practice size. Conversely, more than 30 percent of the larger practices utilized an EHR singly or in combination with other documentation methods versus less than 9 percent of the small practices. The relationship between size and technology used is reinforced when the size of the practice is associated with the coding technology used. Table 2 illustrates that smaller practices clearly utilize the more basic manual technologies. The medium-sized practices still have the physicians assign the codes more often when compared to the other technologies. Table 3 shows that the private physician groups used the least technology for documentation with only approximately 11 percent of the private physician groups utilizing an EHR, while greater than 60 percent of them utilized handwriting and dictation either singly or in combination. HMO, managed care, military, and VA organizations were grouped together since financially they are similar in that third-party reimbursement is not their main source of income. The integrated health delivery systems were grouped together because the numbers were small. Faculty practices are often part of an academic medical center. This is compared to just 10 percent of the private physician groups, slightly more than 15 percent of those classified as other, and almost 19 percent of the integrated health delivery systems. The details are contained in Table 4. The documentation method was compared to the coding method see Table 5. However, there were some surprising combinations of documentation and coding methods. Surprisingly, 26, or almost 6 percent, of the organizations using a free-form EHR for documentation, either singly or in conjunction with other documentation methods, have the clinicians assign the codes. That is, even with the data entered into the computer and the coding technology requiring little to no additional clinician work or effort, 26 organizations still have their clinicians assigning the codes. Discussion The results from this survey are consistent with the previously cited surveys and studies showing that the adoption of EHR technology is highly correlated to the size and type of the organization. It is widely thought that this is because larger and more complex organizations are financially capable of the necessary investments, as well as having the additional necessary personnel to support the implementation of technology. Interestingly, this is clearly one EHR application that could reduce the time burden on physicians. Almost 20 percent of the practices where the clinicians assigned the codes did not perform any type of validation external or internal , while only one of the practices using an EHR to suggest the codes did not perform validation. In the absence of thorough investigation and possible revision of the coding systems, the government and other large payers could develop a certification program for code assignment software that would protect the clinicians from charges of fraud and abuse. The coding software vendors would not be at additional risk with such a program, and any cost they pay for certification should be offset by increased sales since the risk for practices would decrease. Further, it could conceivably be funded by a portion of the funds currently used to pay auditors and lawyers to investigate fraud and abuse charges. If the use of coding technology does result in higher reimbursement via relative value units [RVUs] to clinicians, the payers are always at liberty to reduce the amount they reimburse for each RVU. The principal limitation of this study is its restriction to physician practices employing HIM professionals. These practices might be expected to have higher rates of adoption of documentation and coding technology because they presumably have trained staff to assist with the implementation, unlike physician practices that do not employ these professionals. The low response rate is not thought to be a serious limitation, as the sample and population were not found to be significantly different for any important characteristics. Conclusion This survey found that the level of documentation and coding technology adoption was related to organization size and type. However, the adoption of advanced coding technology was found to be lower than that of advanced documentation technology. This research suggests that, even when there may be financial incentives in the form of increased reimbursement to adopt a technology, other barriers may retard implementation. These results are indicative of a need to investigate the use and quality of the coding systems utilized to quantify the conditions treated and care provided. Further, coding systems must be revised when they cannot meet the needs of clinical and technological advances. Now that the government and payers are implementing quality measurement and pay-for-performance reporting, many times based on coded data, it is vital for coded data to be as reliable and valid as possible, a state of affairs most likely to occur with the implementation of computerized code assignment. Notes Institute for Health Policy Research. Information Base for Progress. Massachusetts General Hospital, Centers for Medicare and Medicaid Services. Audet, Anne-Marie, Michelle M. Institute for Health Policy Research. Cleary, Chelsea Jenter, Lynn A. John Orav, Helen G. Williams, and David W. Use and Adoption of Computer-based Patient Records. California

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