1 **LINGUISTICS**
2 .Translation machine
3 ..Having particular Input/Output device
4 ..Based on phrase, clause, or idiom
5 ..For partial translation
6 ..Punctuation
7 ..Storage or retrieval of data
8 .Multilingual or national language support
9 .Natural language
10 .Dictionary building, modification, or prioritization
200 **SPEECH SIGNAL PROCESSING**
200.1 .Psychoacoustic
201 .For storage or transmission
202 ..Neural network
203 ..Transformation
204 ...Orthogonal functions
205 ..Frequency
206 ...Specialized information
207 ....Pitch
208 .....Voiced or unvoiced
209 ....Formant
210 ....Silence decision
211 ..Time
212 ...Pulse code modulation (PCM)
213 ...Zero crossing
214 ...Voiced or unvoiced
215 ...Silence decision
216 ...Correlation function
217 ....Autocorrelation
218 ....Cross-correlation
219 ..Linear prediction
220 ..Analysis by synthesis
221 ..Pattern matching vocoders
222 ...Vector quantization
223 ...Excitation patterns
224 ..Normalizing
225 ..Gain control
226 ..Noise
227 ...Pretransmission
228 ...Post-transmission
229 ..Adaptive bit allocation
230 ..Quantization
231 .Recognition
232 ..Neural network
233 ..Detect speech in noise
234 ..Normalizing
235 ..Speech to image
236 ..Specialized equations or comparisons
237 ...Correlation
238 ...Distance
239 ...Similarity
240 ...Probability
241 ...Dynamic time warping
242 ...Viterbi trellis
243 ..Creating patterns for matching
244 ...Update patterns
245 ...Clustering
246 ..Voice recognition
247 ...Preliminary matching
248 ...Endpoint detection
249 ...Subportions
250 ...Specialized models
251 ..Word recognition
252 ...Preliminary matching
253 ...Endpoint detection
254 ...Subportions
255 ...Specialized models
256 ....Markov
256.1 .....Hidden Markov Model (HMM) (EPO)
256.2 ......Training of HMM (EPO)
256.3 ....With insufficient amount of training data, e.g., state sharing, tying, deleted interpolation (EPO)
256.4 ......Duration modeling in HMM, e.g., semi HMM, segmental models, transition probabilities (EPO)
256.5 ......Hidden Markov (HM) network (EPO)
256.6 ......State emission probability (EPO)
256.7 ....Continuous density, e.g, Gaussian distribution, Lapalce (EPO)
256.8 ....Discrete density, e.g., Vector Quantization preprocessor, look up tables (EPO)
257 ....Natural language
258 .Synthesis
259 ..Neural network
260 ..Image to speech
261 ..Vocal tract model
262 ..Linear prediction
263 ..Correlation
264 ..Excitation
265 ..Interpolation

266 ..Specialized model
267 ..Time element
268 ..Frequency element
269 ..Transformation
270 .Application
270.1 ..Speech assisted network
271 ..Handicap aid
272 ..Novelty item
273 ..Security system
274 ..Warning/alarm system
275 ..Speech controlled system
276 ..Pattern display
277 ..Translation
278 ..Sound editing
500 **AUDIO SIGNAL BANDWIDTH COMPRESSION OR EXPANSION**
501 .With content reduction encoding
502 .Delay line
503 **AUDIO SIGNAL TIME COMPRESSION OR EXPANSION (E.G., RUN LENGTH CODING)**
504 .With content reduction encoding

E-SUBCLASSES

The following subclasses beginning with the letter E are E-subclasses. Each E-subclass corresponds in scope to a classification in a foreign classification system, for example, the European Classification system (ECLA). The foreign classification equivalent to an E-subclass is identified in the subclass definition. In addition to US documents classified in E-subclasses by US examiners, documents are regularly classified in E-subclasses according to the classification practices of any foreign Offices identified in parentheses at the end of the title. For example, "(EPO)" at the end of a title indicates both European and US patent documents, as classified by the EPO, are regularly added to the subclass. E-subclasses may contain subject matter outside the scope of this class.Consult their definitions, or the documents themselves to clarify or interpret titles.

E17.001 **SPEAKER IDENTIFICATION OR VERIFICATION (EPO)**
E17.002 .Recognition of special voice characteristics, e.g., for use in a lie detector; recognition of animal voices, etc. (EPO)
E17.003 .Systems using speaker recognizers (EPO)
E17.004 .Details (EPO)
E17.005 ..Preprocessing operations, e.g., segment selection, etc., pattern representation or modeling, e.g., based on linear discriminant analysis (LDA), principal components, etc.; feature selection or extraction (EPO)
E17.006 ..Training, model building, enrollment (EPO)
E17.007 ..Decision making techniques, pattern matching strategies (EPO)
E17.008 ...Use of particular distance or distortion metric between probe pattern and reference templates (EPO)
E17.009 ...Multimodal systems, i.e., based on the integration of multiple recognition engines or experts fusion (EPO)
E17.01 ...Score normalization (EPO)
E17.011 ...Use of phonemic categorization or speech recognition prior to speaker recognition or verification (EPO)
E17.012 ..Hidden Markov Models (HMMs) (EPO)
E17.013 ..Artificial neural networks, connectionist approaches (EPO)
E17.014 ..Pattern transformations and operations aimed at increasing system robustness, e.g., against channel noise, different working conditions, etc. (EPO)
E17.015 ..Interactive procedures, man-machine interface (EPO)
E17.016 ...User prompted to utter a password or predefined text (EPO)
E15.001 **SPEECH RECOGNITION (EPO)**
E15.002 .Assessment or evaluation of speech recognition systems (EPO)
E15.003 .Language recognition (EPO)

E15.004 .Feature extraction for speech recognition; selection of recognition unit (EPO)
E15.005 .Segmentation or word limit detection (EPO)
E15.006 ..Word boundary detection (EPO)
E15.007 .Creation of reference templates; training of speech recognition systems, e.g., adaption to the characteristics of the speaker's voice, etc. (EPO)
E15.008 ..Training (EPO)
E15.009 ..Adaptation (EPO)
E15.01 ...In the frequency domain (EPO)
E15.011 ...To speaker (EPO)
E15.012 ....Supervised, i.e., under machine guidance (EPO)
E15.013 ....Unsupervised (EPO)
E15.014 .Speech classification or search (EPO)
E15.015 ..Using distance or distortion measures between unknown speech and reference templates (EPO)
E15.016 ..Using dynamic programming techniques, e.g., Dynamic Time Warping (DTW), etc. (EPO)
E15.017 ..Using artificial neural networks (EPO)
E15.018 ..Using natural language modeling (EPO)
E15.019 ...Using context dependencies, e.g., language models, etc. (EPO)
E15.02 ....Phonemic context, e.g., pronunciation rules, phonotactical constraints, phoneme n-grams, etc. (EPO)
E15.021 ....Grammatical context, e.g., disambiguation of the recognition hypotheses based on word sequence rules, etc. (EPO)
E15.022 .....Formal grammars, e.g., finite state automata, context free grammars, word networks, etc. (EPO)
E15.023 .....Probabilistic grammars, e.g., word n-grams, etc. (EPO)
E15.024 ....Semantic context, e.g., disambiguation of the recognition hypotheses based on word meaning, etc. (EPO)
E15.025 ...Using prosody or stress (EPO)
E15.026 ...Parsing for meaning understanding (EPO)
E15.027 ..Using statistical models, e.g., Hidden Markov Models (HMMs), etc. (EPO)
E15.028 ...Hidden Markov Models (HMMs) (EPO)
E15.029 ....Training of Hidden Markov Models (HMMs) (EPO)
E15.03 .....With insufficient amount of training data, e.g., state sharing, tying, deleted interpolation, etc. (EPO)
E15.031 ....Duration modeling in Hidden Markov Models (HMMs), e.g., semi-HMM, segmental models, transition probabilities, etc. (EPO)
E15.032 ....Hidden Markov Models (HMMs) network (EPO)
E15.033 ....State emission probabilities (EPO)
E15.034 .....Continuous densities, e.g., Gaussian distribution, Laplace, etc. (EPO)
E15.035 .....Discrete densities, e.g., Vector Quantization preprocessor, look-up tables, etc. (EPO)
E15.036 .....Neural Network (NN) as output probability estimator, e.g., hybrid HMM/NN, etc. (EPO)
E15.037 ...Non-hidden Markov Model (EPO)
E15.038 ..Recognition networks (EPO)
E15.039 .Speech recognition techniques for robustness in adverse environments, e.g., in noise, of stress induced speech, etc. (EPO)
E15.04 .Procedures used during a speech recognition process, e.g., man-machine dialogue, etc. (EPO)
E15.041 .Speech recognition using nonacoustical features, e.g., position of the lips, etc. (EPO)
E15.042 ..Using position of the lips, movement of the lips, or face analysis (EPO)
E15.043 .Speech to text systems (EPO)
E15.044 ..Speech recognition depending on application context, e.g., in a computer, etc. (EPO)

E15.045 ..Systems using speech recognizers (EPO)
E15.046 .Constructional details of speech recognition systems (EPO)
E15.047 ..Distributed recognition, e.g., in client-server systems for mobile phones or network applications, etc. (EPO)
E15.048 ..Memory allocation or algorithm optimization to reduce hardware requirements (EPO)
E15.049 ..Multiple recognizers used in sequence or in parallel; corresponding voting or score combination systems (EPO)
E15.05 ..Recognizers for parallel processing (EPO)
E19.001 **SPEECH OR AUDIO SIGNAL ANALYSIS-SYNTHESIS TECHNIQUES FOR REDUNDANCY REDUCTION, E.G., IN VOCODERS, ETC.; CODING OR DECODING OF SPEECH OR AUDIO SIGNALS; COMPRESSION OR EXPANSION OF SPEECH OR AUDIO SIGNALS, E.G., SOURCE-FILTER MODELS, PSYCHOACOUSTIC ANALYSIS, ETC. (EPO)**
E19.002 .Perceptual measures for quality assessment (EPO)
E19.003 .Correction of errors induced by the transmission channel, if related to the coding (EPO)
E19.004 .Lossless audio signal coding; perfect reconstruction of coded audio signal by transmission of coding error (EPO)
E19.005 .Multichannel audio signal coding and decoding, i.e., using interchannel correlation to reduce redundancies, e.g., joint-stereo, intensity-coding, matrixing, etc. (EPO)
E19.006 .Comfort noise, silence coding (EPO)
E19.007 .Speech coding using phonetic or linguistical decoding of the source; reconstruction using text-to-speech synthesis (EPO)
E19.008 .Systems using vocoders (EPO)
E19.009 .Audio watermarking, i.e., embedding inaudible data in the audio signal (EPO)
E19.01 .Using spectral analysis, e.g., transform vocoders, subband vocoders, perceptual audio coders, psychoacoustically based lossy encoding, etc., e.g., MPEG audio, Dolby AC-3, etc. (EPO)
E19.011 ..Blocking, i.e., grouping of samples in time, choice of analysis window, overlap factor (EPO)
E19.012 ...Detection of transients and attacks for time/frequency resolution switching (EPO)
E19.013 ..Noise substitution, i.e., substituting nontonal spectral components by noisy source (EPO)
E19.014 ..Spectral prediction for pre-echo prevention; temporal noise shaping (TNS), e.g., in MPEG2 or MPEG4, etc. (EPO)
E19.015 ..Quantization or dequantization of spectral components (EPO)
E19.016 ...Scalar quantization (EPO)
E19.017 ...Vector quantization, e.g., Twin-VQ audio, etc. (EPO)
E19.018 ..Using subband decomposition (EPO)
E19.019 ...Subband vocoders (EPO)
E19.02 ..Using orthogonal transformation (EPO)
E19.021 ...Using wavelet decomposition (EPO)
E19.022 .Dynamic bit allocation (EPO)
E19.023 .Using predictive techniques; codecs based on source-filter modelization (EPO)
E19.024 ..Determination or coding of the spectral characteristics, e.g., of the short-term prediction coefficients, etc. (EPO)
E19.025 ...Line spectrum pair (LSP) vocoders (EPO)
E19.026 ..Determination or coding of the excitation function; determination or coding of the long-term prediction characteristics (EPO)
E19.027 ...Determination or coding of an excitation gain (EPO)
E19.028 ...Using mixed excitation model, e.g., MELP, MBE, Split band LPC, HVXC, etc. (EPO)

E19.029 ...Long-term prediction, i.e., removing periodical redundancies, e.g., adaptive codebook, pitch predictor, etc. (EPO)
E19.03 ...Using sinusoidal excitation model (EPO)
E19.031 ...Using prototype waveform decomposition or waveform interpolative coders (PWI) (EPO)
E19.032 ...Determination or coding of a multipulse excitation (EPO)
E19.033 ....Algebraic codebook; sparse pulse excitation (EPO)
E19.034 ....Regular pulse excitation (EPO)
E19.035 ...Determination or coding of a code excitation; code excited linear prediction (CELP) vocoders (EPO)
E19.036 ....Pitch excitation, e.g., PSI-CELP (pitch synchronous innovation CELP), etc. (EPO)
E19.037 ....Residual excited linear prediction (RELP) (EPO)
E19.038 ....Vector sum excited linear prediction (VSELP) (EPO)
E19.039 ..Details of speech and audio coders (EPO)
E19.04 ...Vocoder architecture (EPO)
E19.041 ....Vocoders using multiple modes (EPO)
E19.042 .....Using sound class specific coding, hybrid encoders, object-based coding (EPO)
E19.043 .....Mode decision, i.e., based on audio signal content versus external parameter (EPO)
E19.044 .....Variable rate or variable quality codecs, e.g., scalable representation encoding, etc. (EPO)
E19.045 ...Pre- or post-filtering (EPO)
E19.046 ....Pre-filtering, e.g., high frequency emphasis prior to encoding, etc. (EPO)
E19.047 ....Post-filtering, e.g., pitch enhancement, formant emphasis for decoder, etc. (EPO)
E19.048 ...Audio streaming, i.e., formatting and decoding of an encoded audio signal (EPO)
E19.049 ...Transcoding, i.e., converting between two coded representations avoiding cascaded coding-decoding (EPO)
E21.001 **MODIFICATION OF AT LEAST ONE CHARACTERISTIC OF SPEECH WAVES (EPO)**
E21.002 .Speech enhancement, e.g., noise reduction, echo cancellation, etc. (EPO)
E21.003 ..Applications (EPO)
E21.004 ...Speech corrupted by noise (EPO)
E21.005 ....Periodic noise (EPO)
E21.006 ....The noise being separate speech (EPO)
E21.007 ...Speech corrupted by echo-reverberation (EPO)
E21.008 ...Speech corrupted by stress-Lombard effect (EPO)
E21.009 ...Enhancement of intelligibility of clean or coded speech (EPO)
E21.01 ....Enhancement of diverse speech (EPO)
E21.011 ....Bandwidth extension taking place at the receiving side, e.g., generation of low- or high-frequency components, regeneration of spectral holes, etc. (EPO)
E21.012 ...Separate reconstruction of interference and of speech signal (EPO)
E21.013 ....The interference being a separate speaker (EPO)
E21.014 ...Active noise canceling (EPO)
E21.015 ...Public address system (EPO)
E21.016 ..Suppression or repetition of time signal segments (EPO)
E21.017 .Time compression or expansion (EPO)
E21.018 ..Suppression or repetition of time signal segments (EPO)
E21.019 .Transformation of speech into a nonaudible representation, e.g., speech visualization, speech processing for tactile aids, etc. (EPO)
E21.02 ..Synchronization of speech with image or synthesis of the lips movement from speech, e.g., for "talking heads," etc.(EPO)
E11.001 **MISCELLANEOUS ANALYSIS OR DETECTION OF SPEECH CHARACTERISTICS (EPO)**

E11.002 .General speech analysis without concrete application (EPO)
E11.003 .Detection of presence or absence of speech signals (EPO)
E11.004 ..Voice/data decision (EPO)
E11.005 ..End point detection (EPO)
E11.006 .Pitch determination of speech signals (EPO)
E11.007 .Voiced-unvoiced decision (EPO)
E13.001 **SPEECH SYNTHESIS; TEXT TO SPEECH SYSTEMS (EPO)**
E13.002 .Methods for producing synthetic speech; speech synthesizers (EPO)
E13.003 ..Concept-to-speech synthesizers; generation of natural phrases not from text but from machine-based concepts (EPO)
E13.004 ..Sound editing, manipulating voice of the synthesizer (EPO)
E13.005 .Details of speech synthesis systems, e.g., synthesizer architecture, memory management, etc. (EPO)
E13.006 ..Architecture of speech synthesizers (EPO)
E13.007 ..Excitation (EPO)
E13.008 ..Systems using speech synthesizers (EPO)
E13.009 .Elementary speech units used in speech synthesizers; concatenation rules (EPO)
E13.01 ..Concatenation (EPO)
E13.011 .Text analysis, generation of parameters for speech synthesis out of text, e.g., grapheme to phoneme translation, prosody generation, stress, or intonation determination, etc. (EPO)
E13.012 ..Grapheme to phoneme, detection of language (EPO)
E13.013 ..Prosody rules derived from text (EPO)
E13.014 ..Stress or intonation (EPO)

FOREIGN ART COLLECTIONS

FOR 000 **CLASS-RELATED FOREIGN DOCUMENTS**