Appendix I: Boolean Search Strategy

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| **Searches run:** May 18, 2023 |
| **Publication date filter:** January 1, 2015 – May 18, 2023 |
| **Language filter:** None |
| **Search** | **Results** |
| **PubMed** | **3,467** |
| #1: ("Artificial Intelligence"[mesh] OR "artificial intelligence"[tiab] OR "machine learning"[tiab] OR "deep learning"[tiab] OR "computational intelligence"[tiab] OR "computer reasoning"[tiab] OR "computer vision system"[tiab] OR "computer vision systems"[tiab] OR "transfer learning"[tiab] OR "hierarchical learning"[tiab] OR "learning from labeled data"[tiab] OR "support vector network"[tiab] OR "support vector networks"[tiab] OR "support vector machine"[tiab] OR "support vector machines"[tiab] OR "ambient intelligence"[tiab] OR "automated reasoning"[tiab] OR "computer heuristics"[tiab] OR "cognitive technology"[tiab] OR "cognitive technologies"[tiab] OR "cognitive computing"[tiab] OR "cognitive robotics"[tiab] OR "optical character recognition"[tiab] OR "robotic process automation"[tiab] OR "machine intelligence"[tiab] OR "artificial superintelligence"[tiab] OR "artificial general intelligence"[tiab] OR "machine reasoning"[tiab] OR "automated inference"[tiab] OR "heuristic algorithm"[tiab] OR "heuristic algorithms"[tiab] OR metaheuristic\*[tiab] OR meta-heuristic\*[tiab] OR "data mining"[tiab] OR "neural network"[tiab] OR "neural networks"[tiab] OR "neural networking"[tiab] OR "feature learning"[tiab] OR "feature extraction"[tiab] OR "Bayesian learning"[tiab] OR "Bayesian inference"[tiab] OR "multicriteria decision analysis"[tiab] OR "unsupervised learning"[tiab] OR "semi-supervised learning"[tiab] OR "semi supervised learning"[tiab] OR "ANN analysis"[tiab] OR "ANN analyses"[tiab] OR "ANN method"[tiab] OR "ANN methods"[tiab] OR "ANN model"[tiab] OR "ANN models"[tiab] OR "ANN modeling"[tiab] OR "ANN methodology"[tiab] OR "ANN methodologies"[tiab] OR "artificial NN"[tiab] OR "ANN technique"[tiab] OR "ANN techniques"[tiab] OR "ANN output"[tiab] OR "ANN outputs"[tiab] OR "ANN approach"[tiab] OR "network learning"[tiab] OR "random forest"[tiab] OR "relevance vector machine"[tiab] OR "relevance vector machines"[tiab] OR "online analytical processing"[tiab] OR "sentiment analysis"[tiab] OR "sentiment analyses"[tiab] OR "opinion mining"[tiab] OR "sentiment classification"[tiab] OR "sentiment classifications"[tiab] OR "fuzzy logic"[tiab] OR "natural language processing"[tiab] OR "expert system"[tiab] OR "expert systems"[tiab] OR "biological ontology"[tiab] OR "biological ontologies"[tiab] OR "biomedical ontology"[tiab] OR "biomedical ontologies"[tiab] OR "biologic ontology"[tiab] OR "biologic ontologies"[tiab] OR "computer simulation"[tiab] OR "computer simulations"[tiab] OR "Multidimensional Voice Program"[tiab] OR MDVP[tiab] OR "k-nearest neighbor"[tiab] OR "supervised learning algorithm"[tiab] OR "swarm intelligent"[tiab] OR "Swarm intelligence"[tiab] OR "firefly algorithm"[tiab] OR bootstrap\*[tiab] OR "fuzzy data fusion"[tiab])  | 374,243 |
| #2: (Voice[mesh] OR "Voice Recognition"[mesh] OR Speech[mesh] OR Acoustics[mesh] OR Phonation[mesh] OR Linguistics[mesh] OR "Vocal Cords"[mesh] OR Singing[mesh] OR Crying[mesh] OR voice\*[tiab] OR speech\*[tiab] OR acoustic\*[tiab] OR phonat\*[tiab] OR vox[tiab] OR language\*[tiab] OR linguistic\*[tiab] OR speak\*[tiab] OR sing[tiab] OR singing[tiab] OR vocal\*[tiab] OR respirat\*[tiab] OR articulat\*[tiab] OR prosody[tiab] OR pitch[tiab] OR "fundamental frequency"[tiab] OR "fundamental frequencies"[tiab] OR f0[tiab] OR "disturbance index"[tiab] OR jitter\*[tiab] OR shimmer\*[tiab] OR "vocal intensity"[tiab] OR "acoustic voice quality index" [tiab] OR AVQI[tiab] OR "speech-to-noise ratio"[tiab] OR "Speech to noise ratio"[tiab] OR "speech to noise ratios"[tiab] OR "speech-to-noise ratios"[tiab] OR "sound pressure level"[tiab] OR "sound pressure levels"[tiab] OR "cepstral peak prominence"[tiab] OR resonance\*[tiab] OR dysphonia[tiab] OR laryngeal[tiab] OR larynx[tiab] OR laryn[tiab] OR banking[tiab] OR communicat\*[tiab] OR cry[tiab] OR crying[tiab] OR cries[tiab] OR squeal\*[tiab] OR babble[tiab] OR babbling[tiab])  | 2,220,825 |
| #3: (Child[mesh] OR Infant[mesh] OR Adolescent[mesh] OR Pediatrics[mesh] OR "Child Health"[mesh] OR "Infant Health"[mesh] OR "Adolescent Health"[mesh] OR Minors[mesh] OR "Young Adult"[mesh] OR child\*[tiab] OR pediatric\*[tiab] OR paediatric\*[tiab] OR infant[tiab] OR infants[tiab] OR neonat\*[tiab] OR newborn\*[tiab] OR baby[tiab] OR babies[tiab] OR toddler\*[tiab] OR adolescen\*[tiab] OR teen\*[tiab] OR youth\*[tiab] OR juvenile\*[tiab] OR "emerging adult"[tiab] OR "emerging adults"[tiab] OR "young adult"[tiab] OR "young adults"[tiab] OR minor[tiab] OR minors[tiab]) 5,428,993 | 5,428,993 |
| #4: ("Neurodevelopmental Disorders"[mesh] OR "Communication Disorders"[mesh] OR "Speech-Language Pathology"[mesh] OR "Voice Disorders"[mesh] OR "Speech Disorders"[mesh] OR "Speech Production Measurement"[mesh] OR "Laryngeal Diseases"[mesh] OR "Genetic Diseases, Inborn"[mesh] OR "Cleft Lip"[mesh] OR "Cleft Palate"[mesh] OR "Hearing Aids"[mesh:noexp] OR "Cochlear Implants"[mesh] OR "Cochlear Implantation"[mesh] OR "Sleep Apnea, Obstructive"[mesh] OR "Hearing Loss"[mesh] OR "Language Development Disorders"[mesh] OR Asthma[mesh] OR "Rhinitis, Allergic, Seasonal"[mesh] OR "Diabetes Mellitus, Type 1"[mesh] OR "Whooping Cough"[mesh] OR Dyslexia[mesh] OR disorder\*[tiab] OR patholog\*[tiab] OR disease\*[tiab] OR malform\*[tiab] OR abnormal\*[tiab] OR language[tiab] OR autism[tiab] OR autistic[tiab] OR ASD[tiab] OR syndrome\*[tiab] OR syndromic[tiab] OR "Developmental language disorder"[tiab] OR "vocal cord dysfunction"[tiab] OR "dysfunctional vocal cord"[tiab] OR "dysfunctional vocal cords"[tiab] OR "vocal fold lesion"[tiab] OR "vocal fold lesions"[tiab] OR "cleft lip"[tiab] OR "cleft lips"[tiab] OR "cleft palate"[tiab] OR "cleft palates"[tiab] OR "laryngotracheal reconstruction"[tiab] OR "reconstructed larynx"[tiab] OR "reconstructed trachea"[tiab] OR "laryngotracheal reconstructions"[tiab] OR "hearing impairment"[tiab] OR "hearing impairments"[tiab] OR "hearing loss"[tiab] OR deaf[tiab] OR deafness[tiab] OR "hearing impaired"[tiab] OR "cochlear implant"[tiab] OR "cochlear implants"[tiab] OR "cochlear implantation"[tiab] OR "cochlear implantations"[tiab] OR "obstructive sleep apnea"[tiab] OR "obstructive sleep apneas"[tiab] OR OSA[tiab] OR asthma\*[tiab] OR "seasonal allergy"[tiab] OR "seasonal allergies"[tiab] OR "allergic rhinitis"[tiab] OR "allergic rhinosinusitis"[tiab] OR "hay fever"[tiab] OR "Type 1 diabetes"[tiab] OR "type 1 diabetic"[tiab] OR "type 1 diabetics"[tiab] OR "juvenile onset diabetes"[tiab] OR "insulin dependent diabetes"[tiab] OR pertussis[tiab] OR "whooping cough"[tiab] OR dyslexia[tiab] OR dyslexic[tiab] OR biomark\*[tiab] OR healthy[tiab] OR prevent\*[tiab] OR screen\*[tiab] OR develop\*[tiab] OR detect\*[tiab] OR early[tiab] OR diagnos\*[tiab])  | 16,466,029 |
| #5: #1 AND #2 AND #3 AND #4  | 4,828 |
| #6: #5, 2015 – Present  | 3,467 |
|  |  |
| **Cochrane Database** | **318** |
| #1 MeSH descriptor: [Artificial Intelligence] explode all trees | 2,832 |
| #2 ("artificial intelligence" OR "machine learning" OR "deep learning" OR "computational intelligence" OR "computer reasoning" OR "computer vision system" OR "computer vision systems" OR "transfer learning" OR "hierarchical learning" OR "learning from labeled data" OR "support vector network" OR "support vector networks" OR "support vector machine" OR "support vector machines" OR "ambient intelligence" OR "automated reasoning" OR "computer heuristics" OR "cognitive technology" OR "cognitive technologies" OR "cognitive computing" OR "cognitive robotics" OR "optical character recognition" OR "robotic process automation" OR "machine intelligence" OR "artificial superintelligence" OR "artificial general intelligence" OR "machine reasoning" OR "automated inference" OR "heuristic algorithm" OR "heuristic algorithms" OR metaheuristic\* OR meta-heuristic\* OR "data mining" OR "neural network" OR "neural networks" OR "neural networking" OR "feature learning" OR "feature extraction" OR "Bayesian learning" OR "Bayesian inference" OR "multicriteria decision analysis" OR "unsupervised learning" OR "semi-supervised learning" OR "semi supervised learning" OR "ANN analysis" OR "ANN analyses" OR "ANN method" OR "ANN methods" OR "ANN model" OR "ANN models" OR "ANN modeling" OR "ANN methodology" OR "ANN methodologies" OR "artificial NN" OR "ANN technique" OR "ANN techniques" OR "ANN output" OR "ANN outputs" OR "ANN approach" OR "network learning" OR "random forest" OR "relevance vector machine" OR "relevance vector machines" OR "online analytical processing" OR "sentiment analysis" OR "sentiment analyses" OR "opinion mining" OR "sentiment classification" OR "sentiment classifications" OR "fuzzy logic" OR "natural language processing" OR "expert system" OR "expert systems" OR "biological ontology" OR "biological ontologies" OR "biomedical ontology" OR "biomedical ontologies" OR "biologic ontology" OR "biologic ontologies" OR "computer simulation" OR "computer simulations" OR "Multidimensional Voice Program" OR MDVP OR "k-nearest neighbor" OR "supervised learning algorithm" OR "swarm intelligent" OR "Swarm intelligence" OR "firefly algorithm" OR bootstrap\* OR "fuzzy data fusion"):ti,ab,kw | 11,352 |
| #3 #1 OR #2 | 12,450 |
| #4 MeSH descriptor: [Voice] explode all trees | 572 |
| #5 MeSH descriptor: [Voice Recognition] explode all trees | 0 |
| #6 MeSH descriptor: [Speech] explode all trees | 1,325 |
| #7 MeSH descriptor: [Acoustics] explode all trees | 530 |
| #8 MeSH descriptor: [Phonation] explode all trees | 246 |
| #9 MeSH descriptor: [Linguistics] explode all trees | 1,779 |
| #10 MeSH descriptor: [Vocal Cords] explode all trees  | 171 |
| #11 MeSH descriptor: [Singing] explode all trees | 93 |
| #12 MeSH descriptor: [Crying] explode all trees | 418 |
| #13 (voice\* OR speech\* OR acoustic\* OR phonat\* OR vox OR language\* OR linguistic\* OR speak\* OR sing OR singing OR vocal\* OR respirat\* OR articulat\* OR prosody OR pitch OR "fundamental frequency" OR "fundamental frequencies" OR f0 OR "disturbance index" OR jitter\* OR shimmer\* OR "vocal intensity" OR "acoustic voice quality index" OR AVQI OR "speech-to-noise ratio" OR "Speech to noise ratio" OR "speech to noise ratios" OR "speech-to-noise ratios" OR "sound pressure level" OR "sound pressure levels" OR "cepstral peak prominence" OR resonance\* OR dysphonia OR laryngeal OR larynx OR laryn OR banking OR communicat\* OR cry OR crying OR cries OR squeal\* OR babble OR babbling):ti,ab,kw | 203,049 |
| #14 #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13  | 204,107 |
| #15 MeSH descriptor: [Child] explode all trees | 77,718 |
| #16 MeSH descriptor: [Infant] explode all trees | 41,571 |
| #17 MeSH descriptor: [Adolescent] explode all trees | 125,309 |
| #18 MeSH descriptor: [Pediatrics] explode all trees | 1,178 |
| #19 MeSH descriptor: [Child Health] explode all trees | 307 |
| #20 MeSH descriptor: [Infant Health] explode all trees | 84 |
| #21 MeSH descriptor: [Adolescent Health] explode all trees | 84 |
| #22 MeSH descriptor: [Minors] explode all trees | 11 |
| #23 MeSH descriptor: [Young Adult] explode all trees | 84,591 |
| #24 (child\* OR pediatric\* OR paediatric\* OR infant OR infants OR neonat\* OR newborn\* OR baby OR babies OR toddler\* OR adolescen\* OR teen\* OR youth\* OR juvenile\* OR "emerging adult" OR "emerging adults" OR "young adult" OR "young adults" OR minor OR minors):ti,ab,kw | 415,796 |
| #25 #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 | 415,809 |
| #26 MeSH descriptor: [Neurodevelopmental Disorders] explode all trees | 9,895 |
| #27 MeSH descriptor: [Communication Disorders] explode all trees | 2,347 |
| #28 MeSH descriptor: [Speech-Language Pathology] explode all trees | 108 |
| #29 MeSH descriptor: [Voice Disorders] explode all trees  | 703 |
| #30 MeSH descriptor: [Speech Disorders] explode all trees | 1,214 |
| #31 MeSH descriptor: [Speech Production Measurement] explode all trees | 215 |
| #32 MeSH descriptor: [Laryngeal Diseases] explode all trees | 1,629 |
| #33 MeSH descriptor: [Genetic Diseases, Inborn] explode all trees | 16,887 |
| #34 MeSH descriptor: [Cleft Lip] explode all trees | 365 |
| #35 MeSH descriptor: [Cleft Palate] explode all trees | 445 |
| #36 MeSH descriptor: [Hearing Aids] explode all trees | 592 |
| #37 MeSH descriptor: [Cochlear Implants] explode all trees | 216 |
| #38 MeSH descriptor: [Cochlear Implantation] explode all trees | 151 |
| #39 MeSH descriptor: [Sleep Apnea, Obstructive] explode all trees | 2,627 |
| #40 MeSH descriptor: [Hearing Loss] explode all trees | 1,609 |
| #41 MeSH descriptor: [Language Development Disorders] explode all trees | 252 |
| #42 MeSH descriptor: [Asthma] explode all trees | 14,957 |
| #43 MeSH descriptor: [Rhinitis, Allergic, Seasonal] explode all trees | 2,174 |
| #44 MeSH descriptor: [Diabetes Mellitus, Type 1] explode all trees | 6,747 |
| #45 MeSH descriptor: [Whooping Cough] explode all trees | 406 |
| #46 MeSH descriptor: [Dyslexia] explode all trees | 366 |
| #47 (disorder\* OR patholog\* OR disease\* OR malform\* OR abnormal\* OR language OR autism OR autistic OR ASD OR syndrome\* OR syndromic OR "Developmental language disorder" OR "vocal cord dysfunction" OR "dysfunctional vocal cord" OR "dysfunctional vocal cords" OR "vocal fold lesion" OR "vocal fold lesions" OR "cleft lip" OR "cleft lips" OR "cleft palate" OR "cleft palates" OR "laryngotracheal reconstruction" OR "reconstructed larynx" OR "reconstructed trachea" OR "laryngotracheal reconstructions" OR "hearing impairment" OR "hearing impairments" OR "hearing loss" OR deaf OR deafness OR "hearing impaired" OR "cochlear implant" OR "cochlear implants" OR "cochlear implantation" OR "cochlear implantations" OR "obstructive sleep apnea" OR "obstructive sleep apneas" OR OSA OR asthma\* OR "seasonal allergy" OR "seasonal allergies" OR "allergic rhinitis" OR "allergic rhinosinusitis" OR "hay fever" OR "Type 1 diabetes" OR "type 1 diabetic" OR "type 1 diabetics" OR "juvenile onset diabetes" OR "insulin dependent diabetes" OR pertussis OR "whooping cough" OR dyslexia OR dyslexic OR biomark\* OR healthy OR prevent\* OR screen\* OR develop\* OR detect\* OR early OR diagnos\*):ti,ab,kw | 1,297,671 |
| #48 #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 | 1,303,057 |
| #49 #3 AND #14 AND #25 AND #48 | 417 |
|  |  |
| From January 1, 2015 – May 18, 2023: 4 Reviews, 314 Trials |  |
| **Embase** | **4262** |
| #1: 'artificial intelligence'/exp OR 'machine learning'/exp OR 'natural language processing'/exp OR 'artificial intelligence':ab,ti,kw OR 'machine learning':ab,ti,kw OR 'deep learning':ab,ti,kw OR 'computational intelligence':ab,ti,kw OR 'computer reasoning':ab,ti,kw OR 'computer vision system':ab,ti,kw OR 'computer vision systems':ab,ti,kw OR 'transfer learning':ab,ti,kw OR 'hierarchical learning':ab,ti,kw OR 'learning from labeled data':ab,ti,kw OR 'support vector network':ab,ti,kw OR 'support vector networks':ab,ti,kw OR 'support vector machine':ab,ti,kw OR 'support vector machines':ab,ti,kw OR 'ambient intelligence':ab,ti,kw OR 'automated reasoning':ab,ti,kw OR 'computer heuristics':ab,ti,kw OR 'cognitive technology':ab,ti,kw OR 'cognitive technologies':ab,ti,kw OR 'cognitive computing':ab,ti,kw OR 'cognitive robotics':ab,ti,kw OR 'optical character recognition':ab,ti,kw OR 'robotic process automation':ab,ti,kw OR 'machine intelligence':ab,ti,kw OR 'artificial superintelligence':ab,ti,kw OR 'artificial general intelligence':ab,ti,kw OR 'machine reasoning':ab,ti,kw OR 'automated inference':ab,ti,kw OR 'heuristic algorithm':ab,ti,kw OR 'heuristic algorithms':ab,ti,kw OR metaheuristic\*:ab,ti,kw OR 'meta heuristic\*':ab,ti,kw OR 'data mining':ab,ti,kw OR 'neural network':ab,ti,kw OR 'neural networks':ab,ti,kw OR 'neural networking':ab,ti,kw OR 'feature learning':ab,ti,kw OR 'feature extraction':ab,ti,kw OR 'bayesian learning':ab,ti,kw OR 'bayesian inference':ab,ti,kw OR 'multicriteria decision analysis':ab,ti,kw OR 'unsupervised learning':ab,ti,kw OR 'semi-supervised learning':ab,ti,kw OR 'semi supervised learning':ab,ti,kw OR 'ann analysis':ab,ti,kw OR 'ann analyses':ab,ti,kw OR 'ann method':ab,ti,kw OR 'ann methods':ab,ti,kw OR 'ann model':ab,ti,kw OR 'ann models':ab,ti,kw OR 'ann modeling':ab,ti,kw OR 'ann methodology':ab,ti,kw OR 'ann methodologies':ab,ti,kw OR 'artificial nn':ab,ti,kw OR 'ann technique':ab,ti,kw OR 'ann techniques':ab,ti,kw OR 'ann output':ab,ti,kw OR 'ann outputs':ab,ti,kw OR 'ann approach':ab,ti,kw OR 'network learning':ab,ti,kw OR 'random forest':ab,ti,kw OR 'relevance vector machine':ab,ti,kw OR 'relevance vector machines':ab,ti,kw OR 'online analytical processing':ab,ti,kw OR 'sentiment analysis':ab,ti,kw OR 'sentiment analyses':ab,ti,kw OR 'opinion mining':ab,ti,kw OR 'sentiment classification':ab,ti,kw OR 'sentiment classifications':ab,ti,kw OR 'fuzzy logic':ab,ti,kw OR 'natural language processing':ab,ti,kw OR 'expert system':ab,ti,kw OR 'expert systems':ab,ti,kw OR 'biological ontology':ab,ti,kw OR 'biological ontologies':ab,ti,kw OR 'biomedical ontology':ab,ti,kw OR 'biomedical ontologies':ab,ti,kw OR 'biologic ontology':ab,ti,kw OR 'biologic ontologies':ab,ti,kw OR 'computer simulation':ab,ti,kw OR 'computer simulations':ab,ti,kw OR 'multidimensional voice program':ab,ti,kw OR mdvp:ab,ti,kw OR 'k-nearest neighbor':ab,ti,kw OR 'supervised learning algorithm':ab,ti,kw OR 'swarm intelligent':ab,ti,kw OR 'swarm intelligence':ab,ti,kw OR 'firefly algorithm':ab,ti,kw OR bootstrap\*:ab,ti,kw OR 'fuzzy data fusion':ab,ti,kw | 559, 152 |
| #2: 'speech and language'/exp OR 'voice recognition'/exp OR 'speech'/exp OR 'acoustics'/exp OR 'singing'/exp OR 'crying'/exp OR 'vocal cord'/exp OR voice\*:ab,ti,kw OR speech\*:ab,ti,kw OR acoustic\*:ab,ti,kw OR phonat\*:ab,ti,kw OR vox:ab,ti,kw OR language\*:ab,ti,kw OR linguistic\*:ab,ti,kw OR speak\*:ab,ti,kw OR sing:ab,ti,kw OR singing:ab,ti,kw OR vocal\*:ab,ti,kw OR respirat\*:ab,ti,kw OR articulat\*:ab,ti,kw OR prosody:ab,ti,kw OR pitch:ab,ti,kw OR 'fundamental frequency':ab,ti,kw OR 'fundamental frequencies':ab,ti,kw OR f0:ab,ti,kw OR 'disturbance index':ab,ti,kw OR jitter\*:ab,ti,kw OR shimmer\*:ab,ti,kw OR 'vocal intensity':ab,ti,kw OR 'acoustic voice quality index':ab,ti,kw OR avqi:ab,ti,kw OR 'speech-to-noise ratio':ab,ti,kw OR 'speech to noise ratio':ab,ti,kw OR 'speech to noise ratios':ab,ti,kw OR 'speech-to-noise ratios':ab,ti,kw OR 'sound pressure level':ab,ti,kw OR 'sound pressure levels':ab,ti,kw OR 'cepstral peak prominence':ab,ti,kw OR resonance\*:ab,ti,kw OR dysphonia:ab,ti,kw OR laryngeal:ab,ti,kw OR larynx:ab,ti,kw OR laryn:ab,ti,kw OR banking:ab,ti,kw OR communicat\*:ab,ti,kw OR cry:ab,ti,kw OR crying:ab,ti,kw OR cries:ab,ti,kw OR squeal\*:ab,ti,kw OR babble:ab,ti,kw OR babbling:ab,ti,kw | 2,852,403 |
| #3: 'pediatrics'/exp OR 'child'/exp OR 'adolescent'/exp OR 'juvenile'/de OR 'adolescent health'/exp OR 'child health'/exp OR child\*:ab,ti,kw OR pediatric\*:ab,ti,kw OR paediatric\*:ab,ti,kw OR infant:ab,ti,kw OR infants:ab,ti,kw OR neonat\*:ab,ti,kw OR newborn\*:ab,ti,kw OR baby:ab,ti,kw OR babies:ab,ti,kw OR toddler\*:ab,ti,kw OR adolescen\*:ab,ti,kw OR teen\*:ab,ti,kw OR youth\*:ab,ti,kw OR juvenile\*:ab,ti,kw OR 'emerging adult':ab,ti,kw OR 'emerging adults':ab,ti,kw OR 'young adult':ab,ti,kw OR 'young adults':ab,ti,kw OR minor:ab,ti,kw OR minors:ab,ti,kw | 5,784,184 |
| #4: 'speech disorder'/exp OR 'mental disease'/exp OR 'communication disorder'/exp OR 'voice disorder'/exp OR 'voice disorder assessment'/exp OR 'speech analysis'/exp OR 'larynx disorder'/exp OR 'congenital disorder'/exp OR 'cleft lip with or without cleft palate'/exp OR 'palate malformation'/exp OR 'hearing aid'/de OR 'cochlea prosthesis'/exp OR 'sleep disordered breathing'/exp OR 'hearing impairment'/exp OR 'developmental language disorder'/exp OR 'asthma'/exp OR 'allergic rhinitis'/exp OR 'insulin dependent diabetes mellitus'/de OR 'pertussis'/de OR 'dyslexia'/exp OR disorder\*:ab,ti,kw OR patholog\*:ab,ti,kw OR disease\*:ab,ti,kw OR malform\*:ab,ti,kw OR abnormal\*:ab,ti,kw OR language:ab,ti,kw OR autism:ab,ti,kw OR autistic:ab,ti,kw OR asd:ab,ti,kw OR syndrome\*:ab,ti,kw OR syndromic:ab,ti,kw OR 'developmental language disorder':ab,ti,kw OR 'vocal cord dysfunction':ab,ti,kw OR 'dysfunctional vocal cord':ab,ti,kw OR 'dysfunctional vocal cords':ab,ti,kw OR 'vocal fold lesion':ab,ti,kw OR 'vocal fold lesions':ab,ti,kw OR 'cleft lip':ab,ti,kw OR 'cleft lips':ab,ti,kw OR 'cleft palate':ab,ti,kw OR 'cleft palates':ab,ti,kw OR 'laryngotracheal reconstruction':ab,ti,kw OR 'reconstructed larynx':ab,ti,kw OR 'reconstructed trachea':ab,ti,kw OR 'laryngotracheal reconstructions':ab,ti,kw OR 'hearing impairment':ab,ti,kw OR 'hearing impairments':ab,ti,kw OR 'hearing loss':ab,ti,kw OR deaf:ab,ti,kw OR deafness:ab,ti,kw OR 'hearing impaired':ab,ti,kw OR 'cochlear implant':ab,ti,kw OR 'cochlear implants':ab,ti,kw OR 'cochlear implantation':ab,ti,kw OR 'cochlear implantations':ab,ti,kw OR 'obstructive sleep apnea':ab,ti,kw OR 'obstructive sleep apneas':ab,ti,kw OR osa:ab,ti,kw OR asthma\*:ab,ti,kw OR 'seasonal allergy':ab,ti,kw OR 'seasonal allergies':ab,ti,kw OR 'allergic rhinitis':ab,ti,kw OR 'allergic rhinosinusitis':ab,ti,kw OR 'hay fever':ab,ti,kw OR 'type 1 diabetes':ab,ti,kw OR 'type 1 diabetic':ab,ti,kw OR 'type 1 diabetics':ab,ti,kw OR 'juvenile onset diabetes':ab,ti,kw OR 'insulin dependent diabetes':ab,ti,kw OR pertussis:ab,ti,kw OR 'whooping cough':ab,ti,kw OR dyslexia:ab,ti,kw OR dyslexic:ab,ti,kw OR biomark\*:ab,ti,kw OR healthy:ab,ti,kw OR prevent\*:ab,ti,kw OR screen\*:ab,ti,kw OR develop\*:ab,ti,kw OR detect\*:ab,ti,kw OR early:ab,ti,kw OR diagnos\*:ab,ti,kw | 22,970,561 |
| #5: #1 AND #2 AND #3 AND #4 | 5,542 |
| #6: #5 AND [2015-2023]/py | 4,262 |
|  |  |
| **Web of Science Core Collection** | **2,992** |
| #1: TI=("artificial intelligence" OR "machine learning" OR "deep learning" OR "computational intelligence" OR "computer reasoning" OR "computer vision system" OR "computer vision systems" OR "transfer learning" OR "hierarchical learning" OR "learning from labeled data" OR "support vector network" OR "support vector networks" OR "support vector machine" OR "support vector machines" OR "ambient intelligence" OR "automated reasoning" OR "computer heuristics" OR "cognitive technology" OR "cognitive technologies" OR "cognitive computing" OR "cognitive robotics" OR "optical character recognition" OR "robotic process automation" OR "machine intelligence" OR "artificial superintelligence" OR "artificial general intelligence" OR "machine reasoning" OR "automated inference" OR "heuristic algorithm" OR "heuristic algorithms" OR metaheuristic\* OR meta-heuristic\* OR "data mining" OR "neural network" OR "neural networks" OR "neural networking" OR "feature learning" OR "feature extraction" OR "Bayesian learning" OR "Bayesian inference" OR "multicriteria decision analysis" OR "unsupervised learning" OR "semi-supervised learning" OR "semi supervised learning" OR "ANN analysis" OR "ANN analyses" OR "ANN method" OR "ANN methods" OR "ANN model" OR "ANN models" OR "ANN modeling" OR "ANN methodology" OR "ANN methodologies" OR "artificial NN" OR "ANN technique" OR "ANN techniques" OR "ANN output" OR "ANN outputs" OR "ANN approach" OR "network learning" OR "random forest" OR "relevance vector machine" OR "relevance vector machines" OR "online analytical processing" OR "sentiment analysis" OR "sentiment analyses" OR "opinion mining" OR "sentiment classification" OR "sentiment classifications" OR "fuzzy logic" OR "natural language processing" OR "expert system" OR "expert systems" OR "biological ontology" OR "biological ontologies" OR "biomedical ontology" OR "biomedical ontologies" OR "biologic ontology" OR "biologic ontologies" OR "computer simulation" OR "computer simulations" OR "Multidimensional Voice Program" OR MDVP OR "k-nearest neighbor" OR "supervised learning algorithm" OR "swarm intelligent" OR "Swarm intelligence" OR "firefly algorithm" OR bootstrap\* OR "fuzzy data fusion") | 559,410 |
| #2: AB=("artificial intelligence" OR "machine learning" OR "deep learning" OR "computational intelligence" OR "computer reasoning" OR "computer vision system" OR "computer vision systems" OR "transfer learning" OR "hierarchical learning" OR "learning from labeled data" OR "support vector network" OR "support vector networks" OR "support vector machine" OR "support vector machines" OR "ambient intelligence" OR "automated reasoning" OR "computer heuristics" OR "cognitive technology" OR "cognitive technologies" OR "cognitive computing" OR "cognitive robotics" OR "optical character recognition" OR "robotic process automation" OR "machine intelligence" OR "artificial superintelligence" OR "artificial general intelligence" OR "machine reasoning" OR "automated inference" OR "heuristic algorithm" OR "heuristic algorithms" OR metaheuristic\* OR meta-heuristic\* OR "data mining" OR "neural network" OR "neural networks" OR "neural networking" OR "feature learning" OR "feature extraction" OR "Bayesian learning" OR "Bayesian inference" OR "multicriteria decision analysis" OR "unsupervised learning" OR "semi-supervised learning" OR "semi supervised learning" OR "ANN analysis" OR "ANN analyses" OR "ANN method" OR "ANN methods" OR "ANN model" OR "ANN models" OR "ANN modeling" OR "ANN methodology" OR "ANN methodologies" OR "artificial NN" OR "ANN technique" OR "ANN techniques" OR "ANN output" OR "ANN outputs" OR "ANN approach" OR "network learning" OR "random forest" OR "relevance vector machine" OR "relevance vector machines" OR "online analytical processing" OR "sentiment analysis" OR "sentiment analyses" OR "opinion mining" OR "sentiment classification" OR "sentiment classifications" OR "fuzzy logic" OR "natural language processing" OR "expert system" OR "expert systems" OR "biological ontology" OR "biological ontologies" OR "biomedical ontology" OR "biomedical ontologies" OR "biologic ontology" OR "biologic ontologies" OR "computer simulation" OR "computer simulations" OR "Multidimensional Voice Program" OR MDVP OR "k-nearest neighbor" OR "supervised learning algorithm" OR "swarm intelligent" OR "Swarm intelligence" OR "firefly algorithm" OR bootstrap\* OR "fuzzy data fusion")  | 1,263,010 |
| #3: #1 OR #2 | 1,377,387 |
| #4: TI=(voice\* OR speech\* OR acoustic\* OR phonat\* OR vox OR language\* OR linguistic\* OR speak\* OR sing OR singing OR vocal\* OR respirat\* OR articulat\* OR prosody OR pitch OR "fundamental frequency" OR "fundamental frequencies" OR f0 OR "disturbance index" OR jitter\* OR shimmer\* OR "vocal intensity" OR "acoustic voice quality index" OR AVQI OR "speech-to-noise ratio" OR "Speech to noise ratio" OR "speech to noise ratios" OR "speech-to-noise ratios" OR "sound pressure level" OR "sound pressure levels" OR "cepstral peak prominence" OR resonance\* OR dysphonia OR laryngeal OR larynx OR laryn OR banking OR communicat\* OR cry OR crying OR cries OR squeal\* OR babble OR babbling) | 1,654,988 |
| #5: AB=(voice\* OR speech\* OR acoustic\* OR phonat\* OR vox OR language\* OR linguistic\* OR speak\* OR sing OR singing OR vocal\* OR respirat\* OR articulat\* OR prosody OR pitch OR "fundamental frequency" OR "fundamental frequencies" OR f0 OR "disturbance index" OR jitter\* OR shimmer\* OR "vocal intensity" OR "acoustic voice quality index" OR AVQI OR "speech-to-noise ratio" OR "Speech to noise ratio" OR "speech to noise ratios" OR "speech-to-noise ratios" OR "sound pressure level" OR "sound pressure levels" OR "cepstral peak prominence" OR resonance\* OR dysphonia OR laryngeal OR larynx OR laryn OR banking OR communicat\* OR cry OR crying OR cries OR squeal\* OR babble OR babbling) | 3,869,279 |
| #6: #4 OR #5  | 4,678,033 |
| #7: TI=(child\* OR pediatric\* OR paediatric\* OR infant OR infants OR neonat\* OR newborn\* OR baby OR babies OR toddler\* OR adolescen\* OR teen\* OR youth\* OR juvenile\* OR "emerging adult" OR "emerging adults" OR "young adult" OR "young adults" OR minor OR minors)  | 2,197,895 |
| #8: AB=(child\* OR pediatric\* OR paediatric\* OR infant OR infants OR neonat\* OR newborn\* OR baby OR babies OR toddler\* OR adolescen\* OR teen\* OR youth\* OR juvenile\* OR "emerging adult" OR "emerging adults" OR "young adult" OR "young adults" OR minor OR minors)  | 2,469,292 |
| #9: #7 OR #8 | 3,568,507 |
| #10: TI=(disorder\* OR patholog\* OR disease\* OR malform\* OR abnormal\* OR language OR autism OR autistic OR ASD OR syndrome\* OR syndromic OR "Developmental language disorder" OR "vocal cord dysfunction" OR "dysfunctional vocal cord" OR "dysfunctional vocal cords" OR "vocal fold lesion" OR "vocal fold lesions" OR "cleft lip" OR "cleft lips" OR "cleft palate" OR "cleft palates" OR "laryngotracheal reconstruction" OR "reconstructed larynx" OR "reconstructed trachea" OR "laryngotracheal reconstructions" OR "hearing impairment" OR "hearing impairments" OR "hearing loss" OR deaf OR deafness OR "hearing impaired" OR "cochlear implant" OR "cochlear implants" OR "cochlear implantation" OR "cochlear implantations" OR "obstructive sleep apnea" OR "obstructive sleep apneas" OR OSA OR asthma\* OR "seasonal allergy" OR "seasonal allergies" OR "allergic rhinitis" OR "allergic rhinosinusitis" OR "hay fever" OR "Type 1 diabetes" OR "type 1 diabetic" OR "type 1 diabetics" OR "juvenile onset diabetes" OR "insulin dependent diabetes" OR pertussis OR "whooping cough" OR dyslexia OR dyslexic OR biomark\* OR healthy OR prevent\* OR screen\* OR develop\* OR detect\* OR early OR diagnos\*)  | 8,242,145 |
| #11: AB=(disorder\* OR patholog\* OR disease\* OR malform\* OR abnormal\* OR language OR autism OR autistic OR ASD OR syndrome\* OR syndromic OR "Developmental language disorder" OR "vocal cord dysfunction" OR "dysfunctional vocal cord" OR "dysfunctional vocal cords" OR "vocal fold lesion" OR "vocal fold lesions" OR "cleft lip" OR "cleft lips" OR "cleft palate" OR "cleft palates" OR "laryngotracheal reconstruction" OR "reconstructed larynx" OR "reconstructed trachea" OR "laryngotracheal reconstructions" OR "hearing impairment" OR "hearing impairments" OR "hearing loss" OR deaf OR deafness OR "hearing impaired" OR "cochlear implant" OR "cochlear implants" OR "cochlear implantation" OR "cochlear implantations" OR "obstructive sleep apnea" OR "obstructive sleep apneas" OR OSA OR asthma\* OR "seasonal allergy" OR "seasonal allergies" OR "allergic rhinitis" OR "allergic rhinosinusitis" OR "hay fever" OR "Type 1 diabetes" OR "type 1 diabetic" OR "type 1 diabetics" OR "juvenile onset diabetes" OR "insulin dependent diabetes" OR pertussis OR "whooping cough" OR dyslexia OR dyslexic OR biomark\* OR healthy OR prevent\* OR screen\* OR develop\* OR detect\* OR early OR diagnos\*) | 20,002,177 |
| #12: #10 OR #11 | 23,974,526 |
| #13: #3 AND #6 AND #9 AND #12 | 3,933 |
| #14: #3 AND #6 AND #9 AND #12 and 2023 or 2022 or 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 (Publication Years) | 2992 |
|  |  |
| **ClinicalTrials.Gov** | **12** |
| #1: "artificial intelligence" OR "machine learning" | speech OR Voice OR acoustic | Child | 12 |
|  |  |
| **Google Scholar** | 600 |
| #1: ("artificial intelligence" OR "machine learning" OR "deep learning") AND (voice OR speech OR language) AND (child OR children OR pediatrics) AND (Disorder OR disorders OR disease OR diseases) | 100 |
| #2: ("artificial intelligence" OR "machine learning" OR "deep learning") AND (respiration OR pitch OR vocal OR speaking) AND (child OR children OR pediatrics) AND (Disorder OR disorders OR disease OR diseases) | 100 |
| #3: ("artificial intelligence" OR "machine learning" OR "deep learning") AND (dysphonia OR larynx OR communication OR cry) AND (child OR children OR pediatrics) AND (Disorder OR disorders OR disease OR diseases) | 100 |
| #4: ("artificial intelligence" OR "machine learning" OR "deep learning") AND (voice OR speech OR language OR acoustic) AND (child OR children OR pediatrics) AND (autism OR autistic OR syndrome OR syndromic) | 100 |
| #5: ("artificial intelligence" OR "machine learning" OR "deep learning") AND (voice OR speech OR language OR acoustic) AND (child OR children OR pediatrics) AND (dyslexia OR deaf OR "hearing impairment" OR "vocal cord") | 100 |
| #6: ("artificial intelligence" OR "machine learning" OR "deep learning") AND (voice OR speech OR language OR acoustic) AND (child OR children OR pediatrics) AND (screen OR detecting OR prevention OR diagnosis) | 100 |
|  |  |
| **Total for deduplication:** | **11,651** |

Appendix II: Study by Country

|  |  |  |
| --- | --- | --- |
| Country | Study | Reference # |
| Australia [4] | Porter 2019 | [42] |
| Sharan 2017 | [47] |
| Sharan 2019 | [48] |
| Sharan 2021 | [49] |
| Austria [1] | Pokorny 2022 | [40] |
| Brazil [1] | Ribeiro 2020 | [43] |
| Canada [4] | Khalilzad 2022a | [26] |
| Khalilzad 2022b | [27] |
| Salehian Matikolaie 2021  | [45] |
| Sharma 2020 | [50] |
| China [6] | Chen 2023 | [14] |
| Wang 2019a | [57] |
| Wang 2019b | [58] |
| Wu 2019 | [61] |
| Zhang 2020 | [63] |
| Zhang 2022 | [62] |
| Croatia [1] | Mazic 2015 | [33] |
| Czech Republic [1] | Barua 2023 | [11] |
| Kotarba 2020 | [28] |
| Egypt [1] | Badreldine 2018 | [9] |
| Gouda 2019 | [19] |
| France [2] | Bokov 2015 | [12] |
| Deng 2017 | [17] |
| Hungary [1] | Tulics 2018 | [55] |
| India [7] | Aggarwal 2020a | [1] |
| Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| Dubey 2018 | [18] |
| Jayasree 2021 | [22] |
| Moharir 2017 | [36] |
| Sharma 2022 | [51] |
| Indonesia [4] | Amrulloh 2015a | [5] |
| Amrulloh 2015b | [6] |
| Amrulloh 2018 | [7] |
| Nafisah 2019 | [37] |
| Italy [1] | Tartarisco 2021 | [54] |
| Japan [1] | Nakai 2017 | [38] |
| Lebanon [1] | Salehian Matikolaie 2020 | [45] |
| Malaysia [1] | Hariharan 2018 | [20] |
| Palestine [1] | Khalilzad 2022b | [27] |
| Poland [4] | Kotarba 2020 | [28] |
| Miodonska 2016 | [35] |
| Szklanny 2019 | [54] |
| Woloshuk 2018 | [60] |
| Singapore [2] | Balamurali 2021 | [10] |
| Hee 2019 | [21] |
| South Korea [2] | Lee 2020 | [29] |
| Lee 2022 | [30] |
| Sri Lanka [2] | Kariyawasam 2019 | [25] |
| Wijesinghe 2019 | [59] |
| Sweden [1] | Pokorny 2017 | [41] |
| Turkey [1] | Satar 2022 | [46] |
| United Kingdom [1] | Alharbi 2018 | [4] |
| USA [12] | Asgari 2021 | [8] |
| Chi 2022 | [15] |
| Cho 2019 | [16] |
| Ji 2021 | [23] |
| Ji 2019 | [24] |
| MacFarlane 2022 | [31] |
| Manigault 2022 | [32] |
| McGinnis 2019 | [34] |
| Onu 2019 | [39] |
| Sadeghian 2015 | [44] |
| Suthar 2022 | [52] |
| VanDam 2015 | [56] |

Appendix III: Funding Source by Study and Country

|  |  |  |  |
| --- | --- | --- | --- |
| Country | Funding Source | Study | Reference # |
| Australia | ResApp Health | Porter 2019 | [42] |
| Austria | Austrian National Bank (Oesterreichische Nationalbank) | Pokorny 2017 | [41] |
| Pokorny 2022 | [40] |
| Austrian Science Fund | Pokorny 2017 | [41] |
| Pokorny 2022 | [40] |
| Brazil | FAPEMIG | Ribeiro 2020 | [43] |
| Universidade Federal de Ouro Preto | Ribeiro 2020 | [43] |
| Canada | Natural Sciences and Engineering Research Council of Canada | Khalilzad 2022a | [26] |
| Salehian Matikolaie 2020 | [45] |
| Khalilzad 2022b | [27] |
| SMART Technologies | Balamurali 2021 | [10] |
| Hee 2019 | [21] |
| China | Anhui Provincial Natural Science Research Project of Colleges and Universities | Wu 2019 | [61] |
| Dulwich College Suzhou | Aggarwal 2020b | [3] |
| Guangzhou City Scientific Research Project | Zhang 2020 | [63] |
| National Key R&D Program of China | Chen 2023 | [14] |
|  | Zhang 2022 | [62] |
| National Natural Science Foundation of China | Chen 2023 | [14] |
| Wang 2019b | [58] |
| Wu 2019 | [61] |
| Natural Science Foundation of Anhui Province | Wu 2019 | [61] |
| Science and Technology Plan Transfer Payment Project of Sichuan Province | Zhang 2022 | [62] |
| Sichuan University | Zhang 2022 | [62] |
| Sun Yat-sen University | Zhang 2020 | [63] |
| Yibin Municipal People Government University | Zhang 2022 | [62] |
| Egypt | Alexandria University | Badreldine 2018 | [9] |
| European Union | EU H2020 Program | Pokorny 2017 | [41] |
| India | Government of India (Department of Biotechnology) | Dubey 2018 | [18] |
| Government of India (Ministry of Human Resource Development) | Dubey 2018 | [18] |
| Manipal University | Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| NorthCap University | Aggarwal 2018 | [2] |
| Japan | Japan Society for the Promotion of Science | Nakai 2017 | [38] |
| Poland | Polish Ministry of Science | Woloshuk 2018 | [60] |
| Silesian University of Technology | Wu 2019 | [61] |
| Saudi Arabia | King Saud University | Alharbi 2018 | [4] |
| Saudi Ministry of Education  | Alharbi 2018 | [4] |
| The IsDB Transform Fund | Chi 2022 | [15] |
| South Korea | Institute of Information and Communications Technology Planning and Evaluation | Lee 2022 | [30] |
| Sri Lanka | Sri Lanka Institute of Information Technology | Wijesinghe 2019 | [59] |
| Sweden | Ban of Sweden Tercentenary Foundation | Pokorny 2017 | [41] |
| Swedish Research Council | Pokorny 2017 | [41] |
| United States | Auburn University | Suthar 2022 | [52] |
| Lucile Packard Foundation | Chi 2022 | [15] |
| Bill and Melinda Gates Foundation | Amrulloh 2015a | [5] |
| Chi 2022 | [15] |
| Khalilzad 2022a | [26] |
| Salehian Matikolaie 2020 | [45] |
| BioTechMed-Graz | Pokorny 2017 | [41] |
| Bio-X Center | Chi 2022 | [15] |
| Brown University | Manigault 2022 | [32] |
| Coulter Foundation | Chi 2022 | [15] |
| Hartwell Foundation | Chi 2022 | [15] |
| Lucile Packard Foundation | Chi 2022 | [15] |
| National Institute on Deafness and Other Communication Disorders | VanDam 2015 | [56] |
| National Institutes of Health | Asgari 2021 | [8] |
| Chi 2022 | [15] |
| National Science Foundation | Chi 2022 | [15] |
| Old Dominion University - Virginia Modeling | Aggarwal 2020b | [3] |
| Plough Foundation | VanDam 2015 | [56] |
| Stanford University | Chi 2022 | [15] |
| Weston Havens Foundation | Chi 2022 | [15] |

Appendix IV: Condition Type and Group by Study

|  |  |  |  |
| --- | --- | --- | --- |
| Condition Group | Condition Type | Study | Reference # |
| Developmental Condition | Autism Spectrum Disorder | Asgari 2021 | [8] |
| Chi 2022 | [15] |
| Cho 2019 | [16] |
| Deng 2017 | [17] |
| Jayasree 2021 | [22] |
| Lee 2020 | [29] |
| Lee 2022 | [30] |
| MacFarlane 2022 | [31] |
| Nakai 2017 | [38] |
| Pokorny 2017 | [41] |
| Wijesinghe 2019 | [59] |
| Wu 2019 | [61] |
| Dyslexia | Kariyawasam 2019 | [25] |
| Ribeiro 2020 | [43] |
| Intellectual Disability | Aggarwal 2020a | [1] |
| Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| Chen 2023 | [14] |
| Sharma 2020 | [50] |
| Sharma 2022 | [51] |
| Zhang 2020 | [63] |
| Non-Respiratory Condition | Anxiety/Depression | McGinnis 2019 | [34] |
| Zhang 2022 | [62] |
| Ataxia | Tartarisco 2021 | [54] |
| Cerebral Palsy | Nafisah 2019 | [37] |
| Down Syndrome | Jayasree 2021 | [22] |
| Fragile X Syndrome | Pokorny 2022 | [40] |
| Jaundice | Hariharan 2018 | [20] |
| Neonatal Opioid Withdrawal Syndrome (NOWS) | Manigault 2022 | [32] |
| Rett Syndrome | Pokorny 2022 | [40] |
| Sepsis | Khalilzad 2022a | [26] |
| Khalilzad 2022b | [27] |
| Respiratory Conditions | Asphyxia | Badreldine 2018 | [9] |
| Hariharan 2018 | [20] |
| Ji 2021 | [23] |
| Ji 2019 | [24] |
| Moharir 2017 | [36] |
| Onu 2019 | [39] |
| Satar 2022 | [46] |
| Asthma | Amrulloh 2015b | [6] |
| Balamurali 2021 | [10] |
| Hee 2019 | [21] |
| Mazic 2015 | [33] |
| Porter 2019 | [42] |
| Croup | Sharan 2017 | [47] |
| Sharan 2019 | [48] |
| Lower Respiratory Tract Infection | Balamurali 2021 | [10] |
| Pneumonia | Amrulloh 2015b | [6] |
| Porter 2019 | [42] |
| Respiratory Distress Syndrome | Khalilzad 2022b | [27] |
| Salehian Matikolaie 2020 | [45] |
| Upper Respiratory Tract Infection | Balamurali 2021 | [10] |
| Wet/Dry Cough | Amrulloh 2018 | [7] |
| Wheezing | Bokov 2015 | [12] |
| Gouda 2019 | [19] |
| Mazic 2015 | [33] |
| Whooping Cough (Pertussis) | Sharan 2021 | [49] |
| Speech Language Pathology | Deafness | Hariharan 2018 | [20] |
| Ji 2021 | [23] |
| Dysphonia | Tulics 2018 | [55] |
| Hearing Loss | VanDam 2015 | [56] |
| Hypernasality | Dubey 2018 | [18] |
| Wang 2019a | [57] |
| Wang 2019b | [58] |
| Pediatric Speech Delay | Sadeghian 2015 | [44] |
| Sigmatism | Miodonska 2016 | [35] |
| Woloshuk 2018 | [60] |
| Speech Disorder | Suthar 2022 | [52] |
| Speech Language Impairment | Barua 2023 | [11] |
| Kotarba 2020 | [28] |
| Stuttering | Alharbi 2018 | [4] |
| Vocal Nodules | Szklanny 2019 | [54] |

Appendix V: Feature Extraction Method by Study

|  |  |  |
| --- | --- | --- |
| Feature Extraction Method | Study | Reference # |
| AlexNet | Zhang 2022 | [62] |
| Cepstral Coefficients | Aggarwal 2020b | [3] |
| Asgari 2021 | [8] |
| Deng 2017 | [17] |
| Hee 2019 | [21] |
| Khalilzad 2022a | [26] |
| Khalilzad 2022b | [27] |
| MacFarlane 2022 | [31] |
| Manigault 2022 | [32] |
| Salehian Matikolaie 2020 | [45] |
| Wang 2019a | [57] |
| Cochleagram Image Feature (CIF) | Sharan 2017 | [47] |
| Sharan 2019 | [48] |
| Sharan 2021 | [49] |
| Delta Coefficients | MacFarlane 2022 | [31] |
| Miodonska 2016 | [35] |
| Nakai 2017 | [38] |
| Discrete Cosine Series Coefficients (DCSC) | Sadeghian 2015 | [44] |
| Discrete Cosine Tranformation Coefficients (DCTC) | Sadeghian 2015 | [44] |
| Discrete Wavelet Mel Cepstral Coefficient | Wu 2019 | [61] |
| Discrete Wavelet Tranform | Badreldine 2018 | [9] |
| Gouda 2019 | [19] |
| eGeMAPS | Lee 2020 | [29] |
| Energy | Amrulloh 2018 | [7] |
| Pokorny 2022 | [40] |
| Pokorny 2017 | [41] |
| Salehian Matikolaie 2020 | [45] |
| Satar 2022 | [46] |
| Entropy | Amrulloh 2015a | [5] |
| Amrulloh 2015b | [6] |
| Satar 2022 | [46] |
| Tulics 2018 | [55] |
| Fast Fourier Tranformation (FTT) | Nafisah 2019 | [37] |
| Wijesinghe 2019 | [59] |
| Formant Frequency | Amrulloh 2015b | [6] |
| Amrulloh 2018 | [7] |
| Cho 2019 | [16] |
| Wang 2019a | [57] |
| Glottal-to-Noise Excitation Ratio (GNE) | Jayasree 2021 | [22] |
| Harmonic-to-Noise Ratio (HNR) | Asgari 2021 | [8] |
| Jayasree 2021 | [22] |
| Khalilzad 2022b | [27] |
| MacFarlane 2022 | [31] |
| Pokorny 2017 | [41] |
| Tartarisco 2021 | [54] |
| Landmark (LM) Analysis | Suthar 2022 | [52] |
| Tulics 2018 | [55] |
| Linear Predictive Coefficients (LPC) | Aggarwal 2020a | [1] |
| Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| Amrulloh 2018 | [7] |
| Chen 2023 | [14] |
| Hariharan 2018 | [20] |
| Onu 2019 | [39] |
| Wang 2019a | [57] |
| Wu 2019 | [61] |
| Local Binary Patterns (LBP) | Sharma 2020 | [50] |
| Mel Frequency Cepstral Coefficients (MFCC) | Aggarwal 2020a | [1] |
| Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| Alharbi 2018 | [4] |
| Amrulloh 2015a | [5] |
| Amrulloh 2015b | [6] |
| Amrulloh 2018 | [7] |
| Badreldine 2018 | [9] |
| Balamurali 2021 | [10] |
| Chen 2023 | [14] |
| Chi 2022 | [15] |
| Cho 2019 | [16] |
| Dubey 2018 | [18] |
| Gouda 2019 | [19] |
| Hee 2019 | [21] |
| Jayasree 2021 | [22] |
| Ji 2019 | [24] |
| Kariyawasam 2019 | [25] |
| Khalilzad 2022a | [26] |
| Kotarba 2020 | [28] |
| Lee 2022 | [30] |
| Mazic 2015 | [33] |
| McGinnis 2019 | [34] |
| Miodonska 2016 | [35] |
| Moharir 2017 | [36] |
| Nafisah 2019 | [37] |
| Onu 2019 | [39] |
| Pokorny 2022 | [40] |
| Porter 2019 | [42] |
| Ribeiro 2020 | [43] |
| Sadeghian 2015 | [44] |
| Salehian Matikolaie 2020 | [45] |
| Sharan 2017 | [47] |
| Sharan 2019 | [48] |
| Sharan 2021 | [49] |
| Tartarisco 2021 | [54] |
| Tulics 2018 | [55] |
| Wang 2019a | [57] |
| Wijesinghe 2019 | [59] |
| Woloshuk 2018 | [60] |
| Wu 2019 | [61] |
| Non-Linear Entropies | Hariharan 2018 | [20] |
| Non-Gaussianity Score | Amrulloh 2015a | [5] |
| Amrulloh 2015b | [6] |
| Amrulloh 2018 | [7] |
| Pitch and Fundamental Frequency (F0) | Amrulloh 2018 | [7] |
| Cho 2019 | [16] |
| Ji 2021 | [23] |
| MacFarlane 2022 | [31] |
| McGinnis 2019 | [34] |
| Nakai 2017 | [38] |
| Pokorny 2022 | [40] |
| Tartarisco 2021 | [54] |
| Tulics 2018 | [55] |
| Short Time Fourier Transform (STFT) | Gouda 2019 | [19] |
| Signal-to-Noise Ratio (SNR) | Jayasree 2021 | [22] |
| Spectral Components | Asgari 2021 | [8] |
| Chi 2022 | [15] |
| McGinnis 2019 | [34] |
| Nafisah 2019 | [37] |
| Pokorny 2022 | [40] |
| Ribeiro 2020 | [43] |
| Satar 2022 | [46] |
| Tartarisco 2021 | [54] |
| Wang 2019b | [58] |
| Woloshuk 2018 | [60] |
| Statistical Measures | Amrulloh 2018 | [7] |
| Kotarba 2020 | [28] |
| Pokorny 2017 | [41] |
| Woloshuk 2018 | [60] |
| Wavelet Packet Decomposition | Barua 2023 | [11] |
| Wavelet Packet Transform Based Energy | Hariharan 2018 | [20] |
| Wavelet Transform | Wu 2019 | [61] |
| Weighted Linear Predictive Cepstral Coefficients | Aggarwal 2020a | [1] |
| Zero Crossing Rate (ZCR) | Amrulloh 2015a | [5] |
| Amrulloh 2015b | [6] |
| Amrulloh 2018 | [7] |
| Chi 2022 | [15] |
| Cho 2019 | [16] |
| McGinnis 2019 | [34] |
| Nafisah 2019 | [37] |
| Satar 2022 | [46] |

Appendix VI: Artificial Intelligence Model by Study

|  |  |  |
| --- | --- | --- |
| Artificial Intelligence Model | Study | Reference # |
| AdaBoost | Chen 2023 | [14] |
| Automated Language Measures | MacFarlane 2022 | [31] |
| Back Propagation Neural Network | Wang 2019b | [58] |
| Bidirectional Long-Short-Term Memory | Balamurali 2021 | [10] |
| Lee 2020 | [29] |
| Lee 2022 | [30] |
| Extreme Gradient Boosting (XGBoost) | Suthar 2022 | [52] |
| Zhang 2020 | [63] |
| Extreme Learning Machine | Hariharan 2018 | [20] |
| Gaussian Mixture Model | Hee 2019 | [21] |
| Generative Adversarial Networks | Deng 2017 | [17] |
| Hidden Markov Models | Sadeghian 2015 | [44] |
| Improved Binary Dragonfly Optimization Algorithm | Hariharan 2018 | [20] |
| K-Means Algorithm | Satar 2022 | [46] |
| K-Nearest Neighbor | Aggarwal 2020a | [1] |
| Gouda 2019 | [19] |
| Kariyawasam 2019 | [25] |
| Khalilzad 2022a | [26] |
| Tartarisco 2021 | [54] |
| Linear Discriminant Analysis | Aggarwal 2020a | [1] |
| Amrulloh 2015a | [5] |
| Cho 2019 | [16] |
| Sharan 2019 | [48] |
| Suthar 2022 | [52] |
| VanDam 2015 | [56] |
| Woloshuk 2018 | [60] |
| Linear Regression Model | Amrulloh 2018 | [7] |
| McGinnis 2019 | [34] |
| Sharan 2017 | [47] |
| Multilayer Perceptron | Khalilzad 2022b | [27] |
| Naïve Bayes | Chen 2023 | [14] |
| Gouda 2019 | [19] |
| Tartarisco 2021 | [54] |
| Neural Network (Feedforward, Recurrent, Long Short-Term Memory, Convolutional) | Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| Amrulloh 2015a | [5] |
| Amrulloh 2015b | [6] |
| Amrulloh 2018 | [7] |
| Balamurali 2021 | [10] |
| Chi 2022 | [15] |
| Gouda 2019 | [19] |
| Jayasree 2021 | [22] |
| Ji 2019 | [24] |
| Ji 2021 | [23] |
| Kariyawasam 2019 | [25] |
| Lee 2020 | [29] |
| Lee 2022 | [30] |
| Moharir 2017 | [36] |
| Nafisah 2019 | [37] |
| Onu 2019 | [39] |
| Pokorny 2017 | [41] |
| Porter 2019 | [42] |
| Sharan 2021 | [49] |
| Sharma 2022 | [51] |
| Szklanny 2019 | [54] |
| Wang 2019a | [57] |
| Wang 2019b | [58] |
| Wijesinghe 2019 | [59] |
| Wu 2019 | [61] |
| Zhang 2022 | [62] |
| Neuro Fuzzy Algorithm | Nafisah 2019 | [37] |
| Radial Basis Function Network | Aggarwal 2020a | [1] |
| Deng 2017 | [17] |
| Random Forest | Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| Chen 2023 | [14] |
| Chi 2022 | [15] |
| Manigault 2022 | [32] |
| McGinnis 2019 | [34] |
| Suthar 2022 | [52] |
| Tartarisco 2021 | [54] |
| ResNet | Kotarba 2020 | [28] |
| Statistically-Trained Language Model | Alharbi 2018 | [4] |
| Support Vector Machine | Aggarwal 2020a | [1] |
| Aggarwal 2018 | [2] |
| Aggarwal 2020b | [3] |
| Asgari 2021 | [8] |
| Badreldine 2018 | [9] |
| Barua 2023 | [11] |
| Bokov 2015 | [12] |
| Deng 2017 | [17] |
| Dubey 2018 | [18] |
| Gouda 2019 | [19] |
| Ji 2019 | [24] |
| Khalilzad 2022a | [26] |
| Khalilzad 2022b | [27] |
| Lee 2020 | [29] |
| MacFarlane 2022 | [31] |
| Mazic 2015 | [33] |
| McGinnis 2019 | [34] |
| Miodonska 2016 | [35] |
| Nakai 2017 | [38] |
| Pokorny 2022 | [40] |
| Pokorny 2017 | [41] |
| Ribeiro 2020 | [43] |
| Salehian Matikolaie 2020 | [45] |
| Sharan 2017 | [47] |
| Sharan 2019 | [48] |
| Sharma 2020 | [50] |
| Suthar 2022 | [52] |
| Tartarisco 2021 | [54] |
| Tulics 2018 | [55] |
| Wang 2019b | [58] |
| Wu 2019 | [61] |
| Wav2Vec 2.0 | Chi 2022 | [15] |

Appendix VII: Bridge2AI Voice Consortium List of Authors

**Bridge2AI-Voice Consortium**

**2022-2023**

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| --- |
| Co-Principal Investigators and Module Leads (Level 1) |
| Last Name | First Name + Initial |  Degree | Institution | Location | Role | Title | ORCID ID | Email |
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