Technology: Neural Phonetic Speech Analytics™

Nexidia has always invested in original speech technology research and invented the process of rapidly searching audio known as phonetic indexing. Today, Nexidia Interactions Analytics employs Neural Phonetic Speech Analytics™, which combines the strengths of Automatic Speech Recognition (ASR) and phonetic indexing to yield highly accurate results. The outputs of Neural Phonetic Speech Analytics include word level transcripts and sentiment scores for early discovery and query building within Interaction Analytics, as well as phonetic indices that supports searching across 100% of interactions for deep dive root cause analysis.

Word level transcripts and sentiment data are delivered via a breakthrough technique that applies artificial neural networks to the investigation of customer interactions. Neural networks are computational designs that apply machine learning and pattern recognition to complex problems. Influenced by the structure of the human brain, artificial neural networks are well suited to computational problems with large numbers of variables, especially when those problems are of a probabilistic nature. Neural Phonetic Speech Analytics employs neural networks in new and innovative ways for the analysis of audio, expanding the depth, breadth, and accuracy of the results without driving computational costs beyond what is practical for any business. Neural Phonetic Speech Analytics supports customer-specific libraries that ultimately evolve with the business as it grows to support any amount of audio indices simply by adding additional data nodes as needed. The Search Grid also supports elastically scaling the compute power. If a job requires more compute power than is already deployed, additional compute nodes may be added for the duration of the need, then removed. These additional compute nodes need only meet the prerequisites for the Search Grid software; they do not need to match the configuration of the other nodes of the system. For instance, the deployment team may deploy the core, permanent Search Grid servers directly to physical servers, but then deploy the elastic compute nodes via virtual machines. Nexidia Search Grid monitors the workload on every node and distributes new work accordingly, assigning more work to those nodes with more capacity.

Finally, the Neural Phonetic Speech Analytics processes hosted by the Nexidia Search Grid are designed to take maximum advantage of the available resources on any individual server. For instance, deployment teams can scale individual compute nodes vertically with the installation of additional graphical processing units (GPUs) in the server. When one or more GPUs are present, the Search Grid compute node on that server automatically shunts the computations and which data nodes should store or retrieve the audio file from the specified media store and then retrieve the audio file from the specified media store and then re-query the index without having to re-process the audio. The re-query reduces compute costs by matching the phonetic index to yield highly accurate results. The outputs of Neural Phonetic Speech Analytics include word level transcripts and sentiment scores for early discovery and query building within Interaction Analytics, as well as phonetic indices that supports searching across 100% of interactions for deep dive root cause analysis.

The phonetic index can be searched directly on words or phrases or using special operators such as Boolean strings or time-based proximity to other content. Nexidia’s proprietary search engine identifies and matches the phonetic equivalent of the search string and returns relevancy-ranked results. When words or business logic need to be changed, the system can rapidly re-query the index without having to re-process the audio. The result is a process that not only creates the truest representation of spoken audio, but also enables the fastest, most accurate access to the information contained within the audio files.

Architecture: Nexidia Search Grid™

As Neural Phonetic Speech Analytics is the technology that powers Nexidia Interactions Analytics, Nexidia Search Grid is the architecture that manages and operates the neural phonetic engine. The Search Grid is a highly scalable, distributable, parallel processing system for efficiently indexing audio (both phonetically and via transcription), storing and managing the resultant phonetic indices and transcription results, and then very quickly searching them.

Big Data Methodology

Based on MapReduce principles for parallel processing, the Search Grid consists of three major components: gateway node, data nodes, and compute nodes. The gateway node receives requests for work from a client application, in this case Nexidia Interaction Analytics. The most common work requests are for indexing new audio files and searching existing indices with search terms or structured queries. The gateway node “maps” the request; it determines which compute nodes should perform the computations and which data nodes should store or retrieve the indices, and then distributes the work. If the request involves indexing a new audio file, the designated compute node will
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PHONETIC SEARCH

Neural Phonetic Speech Analytics generates a time-aligned phonetic index. This index is based on phonemes, the distinct sounds that make up language. Because phonemes are simply uttered sounds, the indexing is not affected by factors such as background noise, languages, dialects or speaking styles. Nexidia Interaction Analytics uses the structured queries derived from topic modeling to search across a phonetic index of 100% of customer interactions. This quantified approach calculates the statistics for root cause analysis, data mining, and metric-driven performance management.

PHRASE RECOGNITION

The narrative models begin with an industry-specific lexicon based on real world conversational data and acoustic properties delivered by Nexidia. Using interactions and other text data (chats, emails, after-call surveys, social media, product and training documentation, CRM case notes, etc.) referencing the customer's environment, such as background noise, languages, dialects or speaking styles. Nexidia Interaction Analytics uses the structured queries derived from topic modeling to search across a phonetic index of 100% of customer interactions. This quantified approach calculates the statistics for root cause analysis, data mining, and metric-driven performance management.

Neural Phonetic Speech Analytics™ supports phrase recognition and sentiment detection to uncover emerging trends in the contact center.

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UNSURPASSED SCALABILITY

The parallel processing design of the Nexidia Search Grid makes it highly scalable horizontally. The architecture of the Search Grid allows for data partitioning across any number of data nodes. Consequently, the Grid can grow to support any amount of audio indices simply by adding additional data nodes as needed. The Search Grid also supports elastically scaling the compute power. If a job requires more compute power than is already deployed, additional compute nodes may be added for the duration of the need, then removed. These additional compute nodes need only meet the prerequisites for the Search Grid software; they do not need to match the configuration of the other nodes of the system. For instance, the deployment team may deploy the core, permanent Search Grid servers directly to physical servers, but then deploy the elastic compute nodes via virtual machines. Nexidia Search Grid monitors the workload on every node and distributes new work accordingly, assigning more work to those nodes with more capacity.

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With the ability to scale both horizontally and vertically, Nexidia Search Grid optimizes hardware utilization by dynamically scaling to meet demand. Where other solutions require multiple instances of software in order to keep up with large implementations, Nexidia Search Grid manages with one instance of the system, providing unparalleled computational efficiency and scale.  

Nexidia Grid Logical Architecture