A Novel Approach to Call Quality Assessment Using Deep Neural Networks

Chirita, Sandu (School: B. Z. Herzl ORT Technological Lyceum)

Over the last years VoIP is constantly outperforming traditional mobile networks with more than one billion users in 2017. However, the voice quality is often affected by issues like noise, distortions and others. The measurements provided by systems meant to address this problem are unreliable when the presence of certain symptoms can help understand what problem should be fixed to increase the voice quality. The goal of this work is to develop an algorithm able to detect and localize specific low voice call quality symptoms with at least 80% accuracy, introducing a novel approach to call quality assessment. Deep neural networks were chosen as the main detection method. The algorithm was trained to distinguish voice, detect interruptions and predict the noise level on a range from 0 to 100%. The audio files were divided in small intervals and decomposed. Different frequency domain representations, window sizes and neural network architectures were tested. The best performing architecture gave 93,52% accuracy. The results were validated on a dataset of 285 human labeled real audio test call recordings and performed with an accuracy of 85,63%. The optimal architecture was implemented in a call quality diagnosis interface, detecting audio quality issues and able to be trained on new symptoms. The developed tool provides a reliable way for companies to automate the call quality troubleshooting process. The obtained system is tested by an European telecom company. Future work includes extending the range of the detected symptoms and optimising the existing algorithm.

Awards Won:

Second Award of $2,000