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An IVR call performance classification system using computational intelligent techniques

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Abstract

Speech recognition adoption rate within Interactive Voice Response (IVR) systems is on the increase. If implemented correctly, businesses experience an increase of IVR utilization by customers, thus benefiting from reduced operational costs. However, it is essential for businesses to evaluate the productivity, quality and call resolution performance of these self-service applications. This research is concerned with the development of a business analytics for IVR application that could assist contact centers in evaluating these self-service IVR applications. A call classification system for a pay beneficiary IVR application has been developed. The system comprises of field and call performance classification components. 'Say account', 'Say amount', 'Select beneficiary' and 'Say confirmation' field classifiers were developed using Multi-Layer Perceptron (MLP) Artificial Neural Network (ANN), Radial Basis Function (RBF) ANN, Fuzzy Inference System (FIS) as well as Support Vector Machine (SVM). Call performance classifiers were also developed using these computational intelligent techniques. Binary and real coded Genetic Algorithm (GA) solutions were used to determine optimal MLP and RBF ANN classifiers. These GA solutions produced accurate MLP and RBF ANN classifiers. In order to increase the accuracy of the call performance RBF ANN classifier, the classification threshold has been optimized. This process increased the classifier accuracy by approximately eight percent. However, the field and call performance MLP ANN classifiers were the most accurate ANN solutions. Polynomial and RBF SVM kernel functions were most suited for field classifications. However, the linear SVM kernel function is most accurate for call performance classification. When compared to the ANN and SVM field classifiers, the FIS field classifiers did not perform well. The FIS call performance classifier did outperform the RBF ANN call performance network. Ensembles of MLP ANN, RBF ANN and SVM field classifiers were developed. Ensembles of FIS, MLP ANN and SVM call performance classifiers were also implemented. All the computational intelligent methods considered were compared in relation to accuracy, sensitivity and specificity performance metrics. MLP classifier solution is most appropriate for 'Say account' field classification. Ensemble of field classifiers and MLP classifier solutions performed the best in 'Say amount' field

classification. Ensemble of field classifiers and SVM classifier solutions are most suited in ‘Select beneficiary’ and ‘Say confirmation’ field classifications. However, the ensemble of call performance classifiers is the preferred classification solution for call performance.