Modeling of an artificial intelligence based enterprise callbot with natural language processing and machine learning algorithms

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Article Info

ABSTRACT

The management of customer services by telephone encounters several problems: an uncontrollable flow of calls, complicated resource management, a very high cost of service, and more. Opportunities to improve the quality of service, save time and money triggered the widespread implementation of artificial intelligence (AI) based callbot. This article outlines the straightforward workflow developed to model the architecture of the callbot. Therefore, several algorithms were evaluated and compared based on real knowledge of a call center of an insurance society. The algorithms considered are: k-nearest neighbours (KNN), support vector machine (SVM), random forests (RF), logistic regression (LR), and Naïve Bayes (NB). The comparison criteria are: correct responses, response time, accuracy, Cohen's kappa and F1 score using n-gram (1.1) and (2.2). The results obtained show that the SVM (accuracy=70.29%) presents the best results on all the comparison criteria. The comparison between the results of the human agents and the callbot shows an improvement in several levels: the cost savings are greater than 80% on all the tests carried out, the holding time decrease to 0 seconds, and the processing time (almost a third or more). The results obtained sufficiently meet the objectives of this project.

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1. INTRODUCTION

Many industrial and service companies nowadays offer their customers a remote service by telephone. Thus, the customer service companies are more and more present to meet the needs of the customers and with it was born a new concept of call center agent: the callbot. This concept is part of the technology family used to streamline communication with customers, such as voice agents, phonebots, conversational agents, and more. On other hand, several difficulties are identified in the management of customer services, among which we find: a large number of customer calls which leads to an enormous cost for the treatment, and a big difficulty to provide a 24/7 service with good quality. The callbot is a less well-known solution compared to another variant of the automatic system (chatbots [1]-[10]). This technology is an artificial intelligence (AI) that can manage a dialogue with a customer during a telephone call, to meet his need, and to solve it autonomously, 24 hours a day, without waiting time. This article outlines the straightforward workflow developed to model the callbot architecture. In this context, the machine has the role of understanding the dialogue and interacting