

Mathematical Statistics Stockholm University Master Thesis **2020:1** http://www.math.su.se

Speech Recognition with Hidden Markov Models a study about isolated word recognition

Gonzalo Aponte Navarro*

February 2020

Abstract

Hidden Markov Models (HMM's) are a versatile class of statistical models which have been used in various contemporary speech recognition systems. In this study it was explored how these models could be applied for recognizing words in a data set with recordings of 11 different words. Feature vectors based on the Discrete Fourier Transform (DFT) were used for word modelling and recognition. Variations of the HMM's were fitted and tested on the data set. The out-of-sample error for each model was estimated by performing a 10-fold crossvalidation. Moreover, the full data set was used for both training and testing. In the latter experiment, the smallest total error among the constructed word recognizers was 13.3 %. Furthermore, the study explored how HMM's could be used for detecting the presence of words in a recording. The word detector failed to detect certain segments of different words but performed well in other cases.

^{*}Postal address: Mathematical Statistics, Stockholm University, SE-106 91, Sweden. E-mail: gonzalo.navarro@outlook.com. Supervisor: Chun-Biu Li.