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Modelling appraised interest using eye tracking data

Master thesis
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Introduction

In this project we explored a problem of affective computing, where we applied computer science to predict emotions and impressions. We used eye tracking data, that was recorded while experiment participants were reading articles. This data was used to evaluate how interesting, complex and comprehensible the read articles were.

We develop a framework to visualize, study, process and aggregate the data for further use in modelling interest directly from the signal, as well as, a model adopted from van der Sluis [1] where interest is modeled through first assessing perceived textual complexity and comprehension.

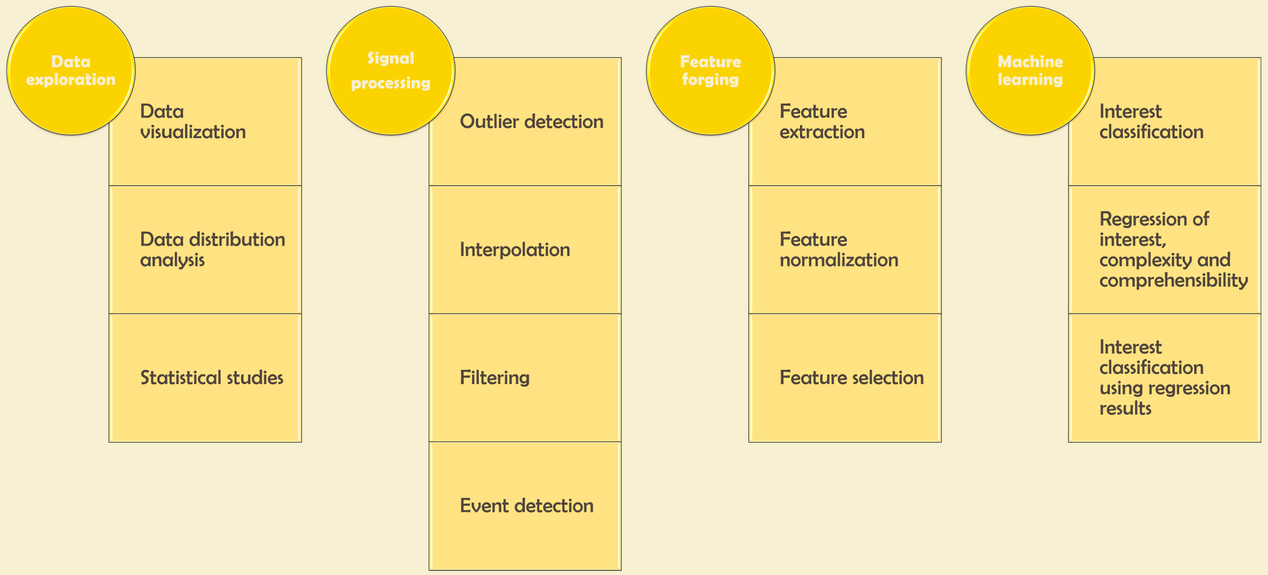
Methodology

To process the eye tracking signal we apply several signal processing techniques including outlier detection using boundix box around the text image, interpolation of samples within identified gaps in the signal. Then we apply a smoothing filter and run event detection to detect fixations and saccades within the recording. These events represent vision fixating at certain locations or fast transitions between the points of interest.

Extracted events are described by calculating statistics for their feature distributions are then used for classification and regression models of random forrest and support vector machine. Moreover, feature selection and normalization is applied to the measures to acquire best results.

Project outline

The project was conducted in four major sections. First the data was explored by visualizing it and analyzing underlying statistical distributions. Next, the eye tracking data is processed using signal procesing framework. The signal is described with quantified feature parameters that are then used for modelling user's opinion on the article.



Results

A classification model was trained to predict whether a read article was interesting or not using only the eye tracking data. The accuracy of 83.67% was achieved using normalized dataset and random forrest model.

When we also factored in the grades of complexity and comprehension provided by the participants, we were able to achieve 86.47% accuracy by using the eye tracking data combined with the grades of comprehension for the text.

Despite not achieving stellar results in predicting grades for textual complexity and comprehension, using the eye tracking signal, using these predicted values improved our results up to 84.35% accuracy using the classification model from the features of the reading pattern directly combined with predicting the comprehension of the text from the same data using a regression model.