University Of Edinburgh

DME:

Mini-Project Report

by
Dragoș Stanciu
Alex McMurray
Andrew Ferguson
Tim Sterker

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Abstract

Some abstract text. . .

Contents

1 Overview

Data

- EEG time series data
- **asynchronous**:
  "subject does not follow any fixed scheme but concentrates repetitively on a mental task for a random amount of time and switches directly to the next, without passing through a rest state"
- preprocessing was done to also be able to use weka
- exploratory data analysis to get a feel for the data. . .

Classification
Different classification methods were used: explicit time series models (HMM, NN?, . . .) and others that ignore fact that data is a time series (SVM, . . .).

Training Data
Mostly the precomputed PSD data was used for classification. $\rightarrow$ because it reduces data $\rightarrow$ because it "summarizes" the data, also in a sense encodes some time information? $\rightarrow$ . . .

2 Previous Work

> **Notes:**
>
> - We are supposed to review about 2-3 papers on the topic.

. . . brief literature review . . .

3 Data Preparation

WEKA Format
To be able to use the data in WEKA
$\rightarrow$ python script to convert ascii into arff format

Concatenation
In order to combine data of different sessions
$\rightarrow$ python script to concatenate arff files

. . .

4 Exploratory Data Analysis

- Distribution of feature values
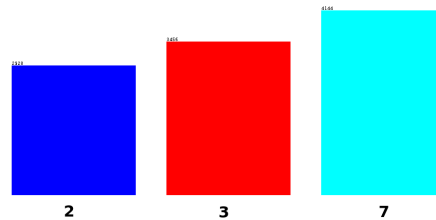- Correlations between features?
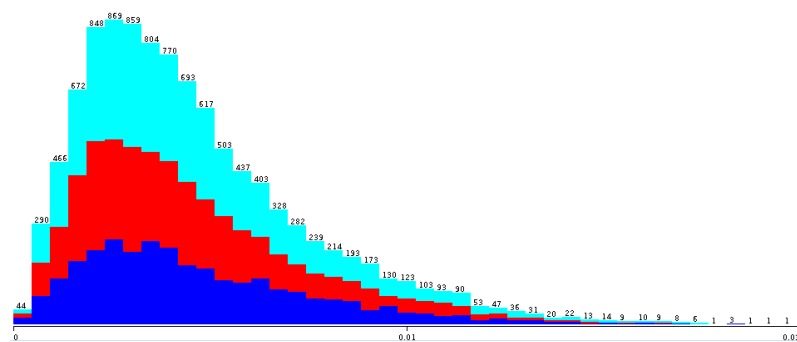- Separability?
- …

Figure 1: Distribution of classes

Figure 2: Distribution of PSD feature values. Generally normal distributed but "skewed" with long right tail (outliers, noise?)

(a) Correlation of features

(b) Correlation of features

(c) Correlation of highest ranked features using Information Gain
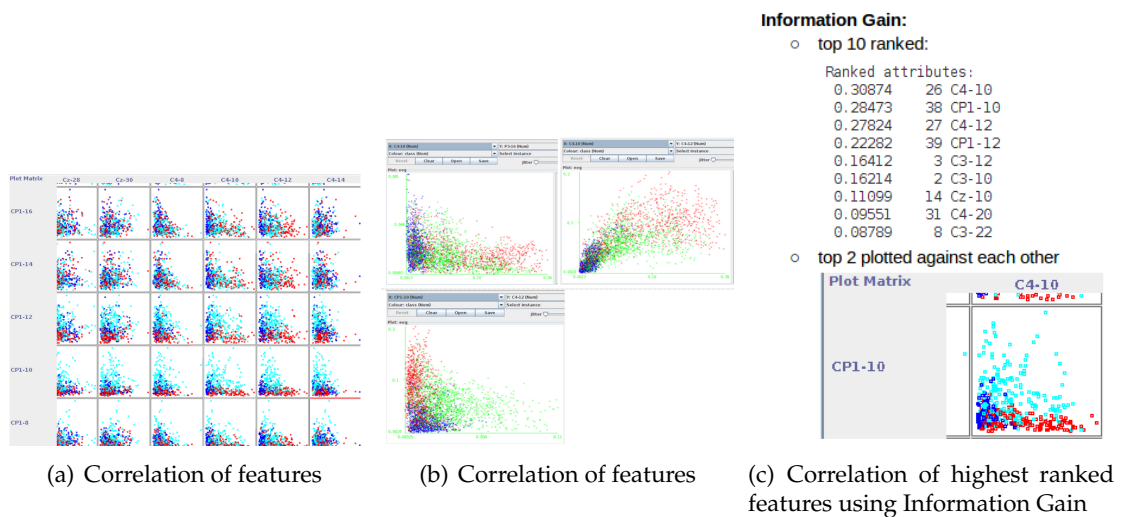
Figure 3: Correlation of Features

5 Learning Methods Used

Chosen Learning Methods based on *Literature Review* and *Exploratory Data Analysis*

- SVM
- Logistic Regression
- …

6 Results & Evaluation

…

7 Conclusion

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References

[1] JR del Millán. On the need for on-line learning in brain-computer interfaces. *Neural Networks, 2004 IEEE International Joint Conference*, 2004.