

# Schizophrenia Classification

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# What is Schizophrenia

- Mental Disorder
- Abnormal social behaviour
- Fails to understand reality



Self portrait of a man with schizophrenia

# Common Symptoms

- False beliefs
- Unclear/Confused thinking
- Non-existent voices hearing
- Reduced emotional expression

# Causes of Schizophrenia

- Genetic
  - Environmental
    - Raised in a city
    - Cannabis during adolescence
    - Certain infections
    - Parental age
    - Poor nutrition during pregnancy
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# Understanding the Data

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# Understanding the Data

**86 People characterized as Schizophrenic or not**

**2 Datasets/Person:**

**FNC - Functional Network Connectivity:**

Correlation values that summarize the overall connection between independent brain maps over time.

378 samples/person

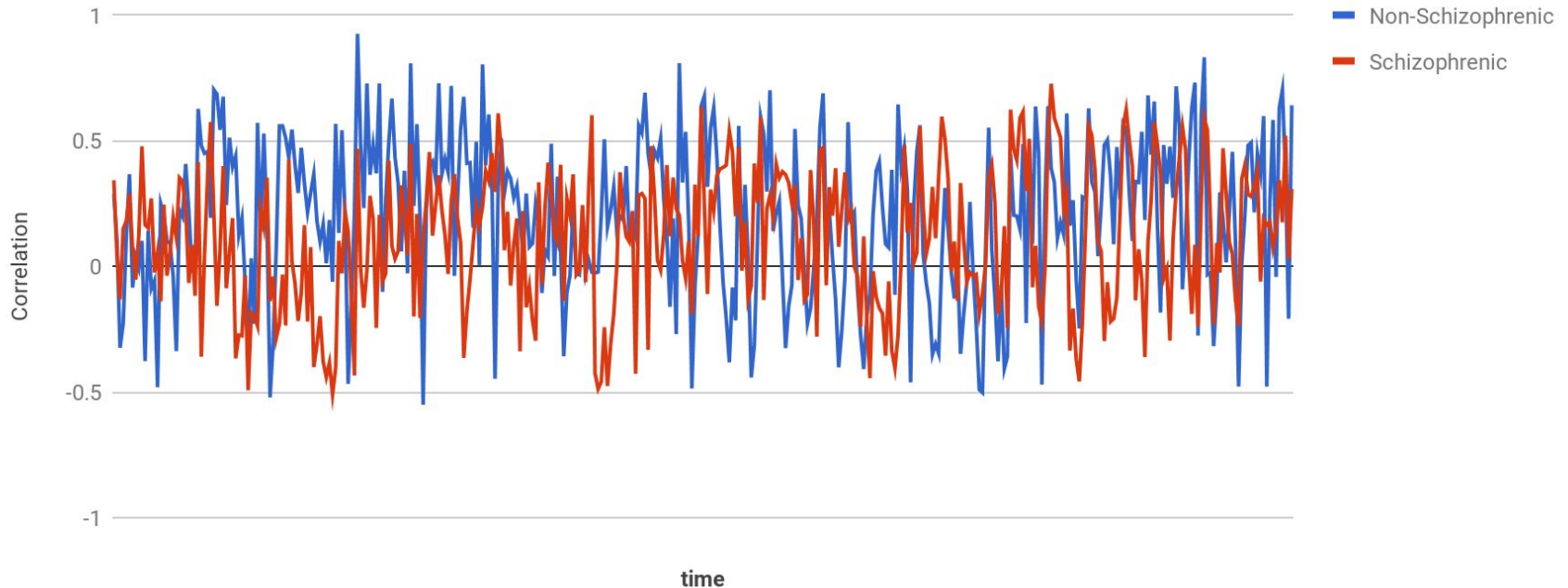
**SBM - Source-Based Morphometry:**

Weights of brain maps obtained from the application of independent component analysis (ICA) on the gray-matter concentration maps of all subjects.

32 samples/person

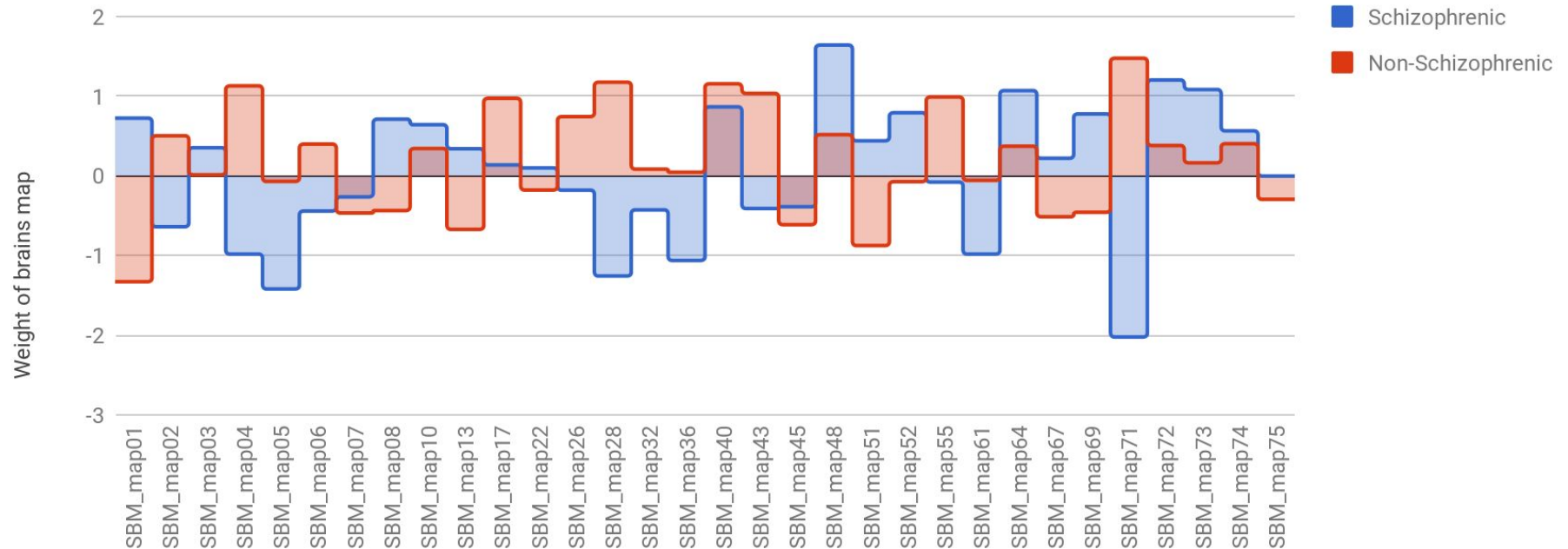
# Understanding the Data - FNC

FNC of a Scizophrenic and a Non-Schizophrenic person



# Understanding the Data - SBM

SBM of a Schizophrenic and a Non-Schizophrenic person



# Training and Testing

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# Training and Testing - Classifiers

- Random Forest
- Support Vector Machine (SVM) :
  - Linear kernel
  - Polynomial kernel
  - Sigmoid kernel
  - Radial basis function kernel
- K Nearest Neighbours (KNN)
- Gaussian Naive Bayes
- Decision Tree

# Training and Testing

First thought : Naive train\_test\_split

Test size up to 20% of whole dataset leads to disappointing accuracies

Second thought : Cross validation with Kfold

Small values of k came up to better accuracies

Final thought: Leave-one-out cross validation

Due to small dataset was the best possible solution

# Feature Selection

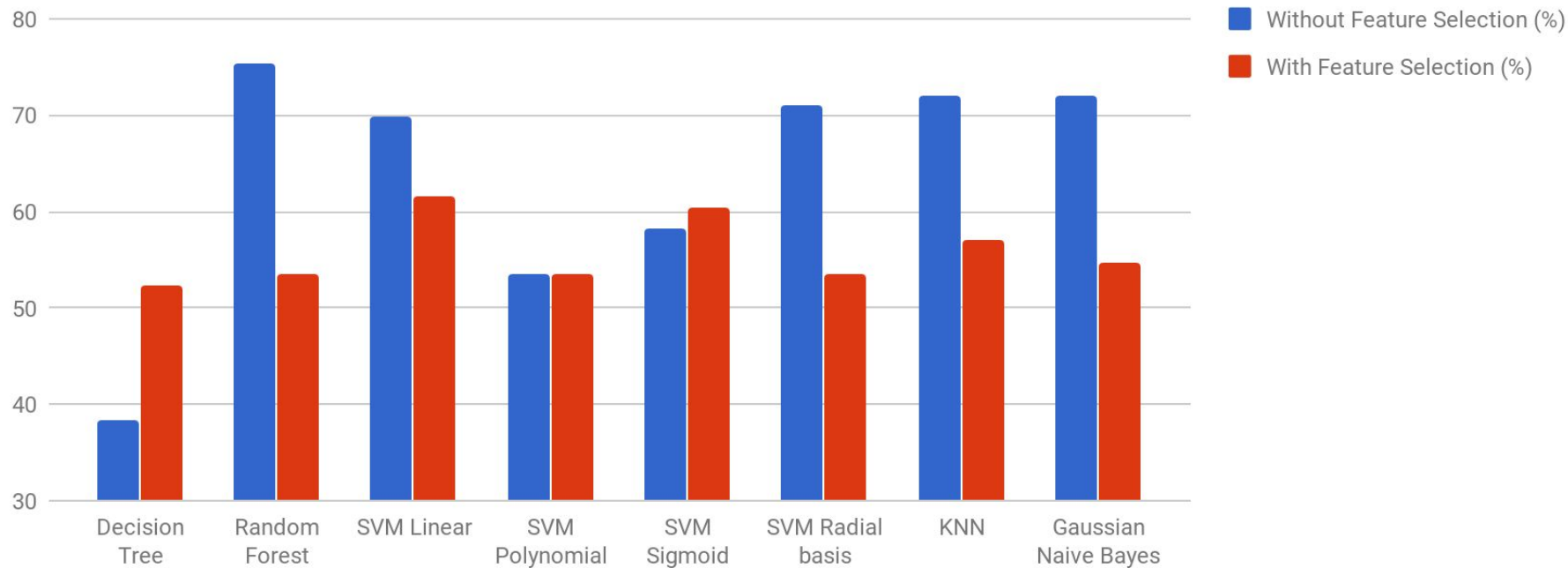
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# Feature Selection

- Optional step but we gave it a shot :D
- Principal Component Analysis (PCA)
- From 411 dimensions down to 79
- The first 79 eigenvalues correspond to approximately 99% of the all variance
- Worse accuracy up to 20% in Random Forest and SVM classifiers

# Results

## Classifier accuracies



# Lessons Learnt

- ML in Biomedical Engineering
- Sklearn
- PCA
- Cross-Validation
- Various Classifiers



# Thank you!

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Any questions?