

# Features for Emotion Recognition

- a comparative study of feature selection methods



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# Content

- **Basic concepts**
  - Emotion
  - valence/arousal
  - Emotion recognition with machine learning
- **Features**
  - EEG
  - non-EEG
- **Problem Statement**
- **Goals**
- **Solution**
- **Results**
- **Next steps**

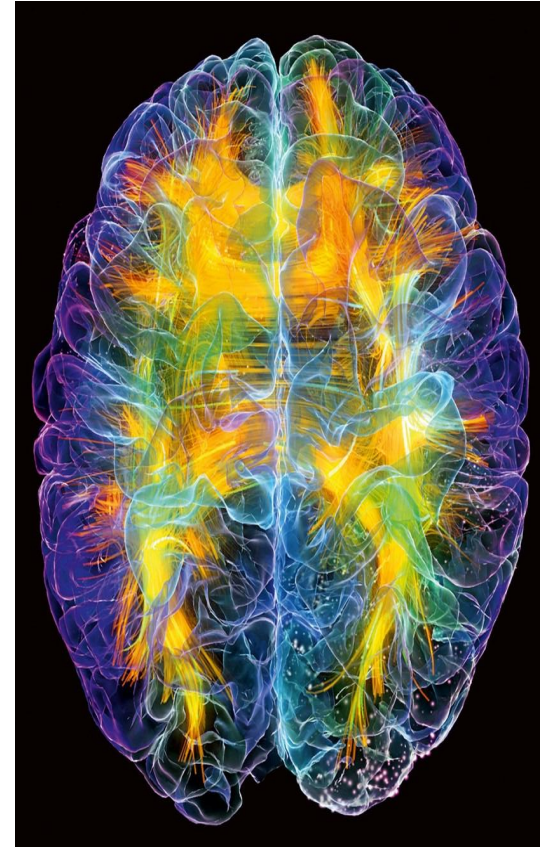
# Emotion



Expression

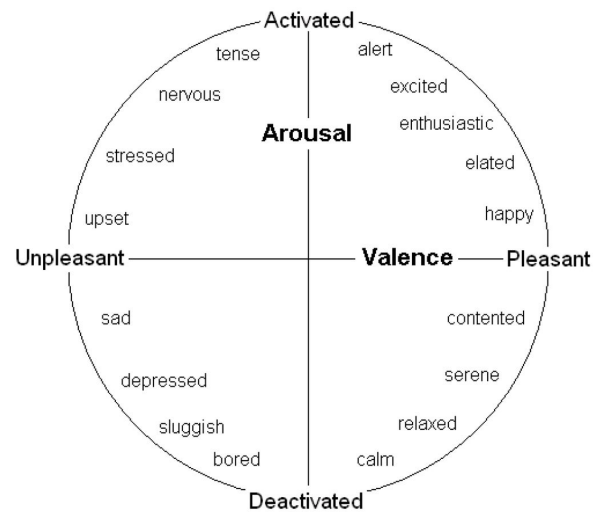


Physiological



Emotion in the brain

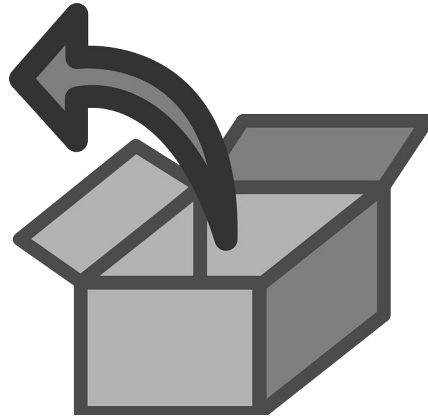
# Emotion Classification



# Emotion recognition using ML



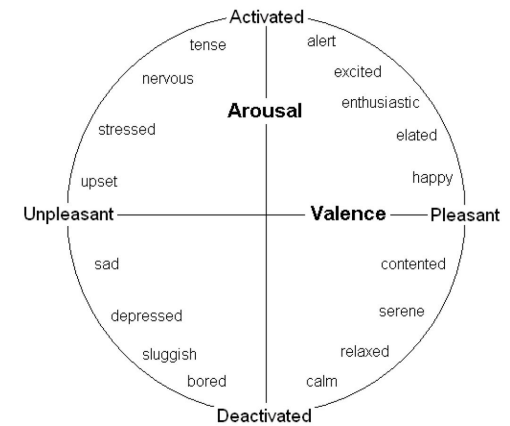
IN: physiological signals



Extract Features



Machine learning



Out: valence/arousal

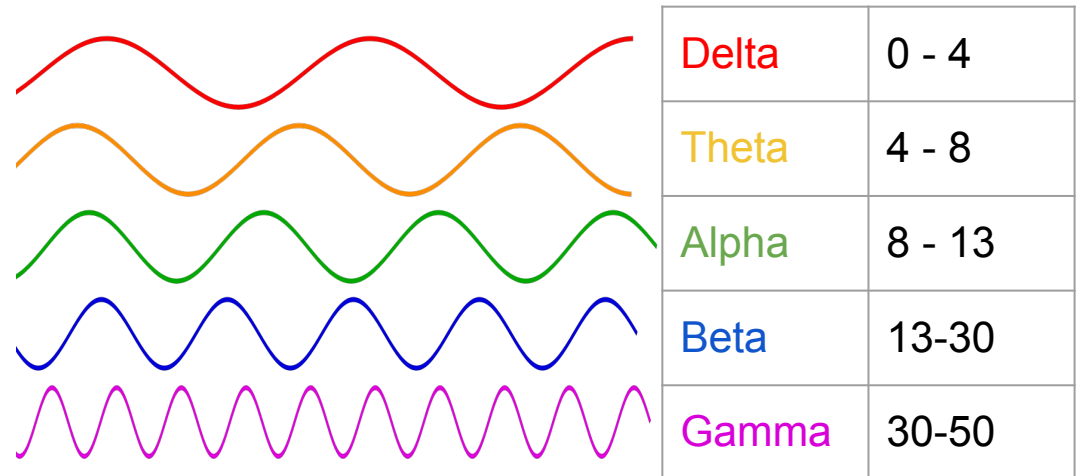
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# EEG



Different channels



Different frequency bands

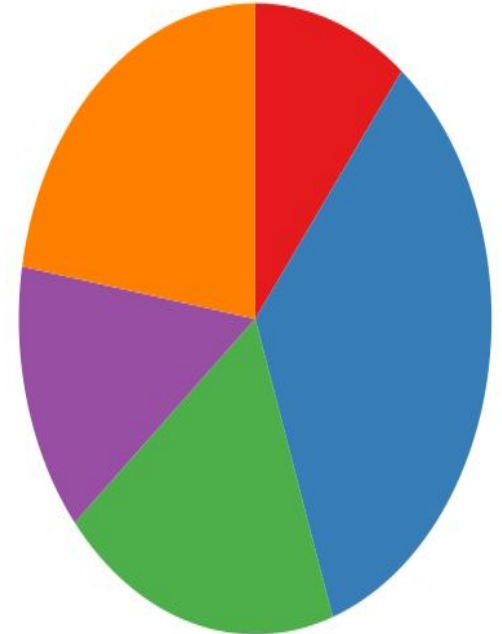
# EEG features



Power of a specific channel



(A)symmetry features  
- Left vs. Right  
- Front vs. Back



Fractions of different wavebands



# Non - EEG Features



Heart Rate



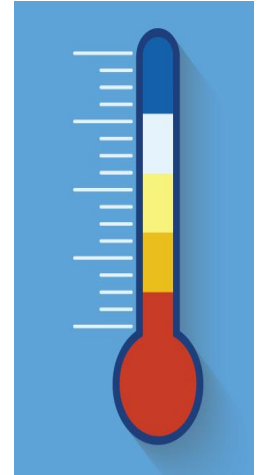
Respiration Rate



Galvanic Skin  
Response



Blood pressure)

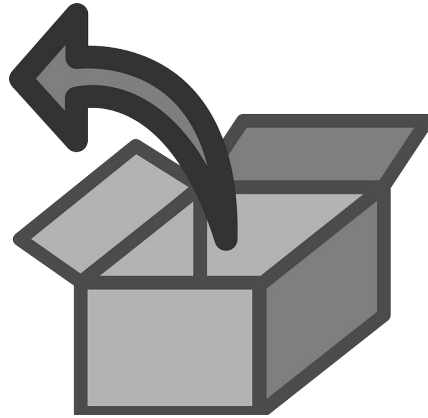


Skin  
Temperature

# Emotion recognition using ML - recap



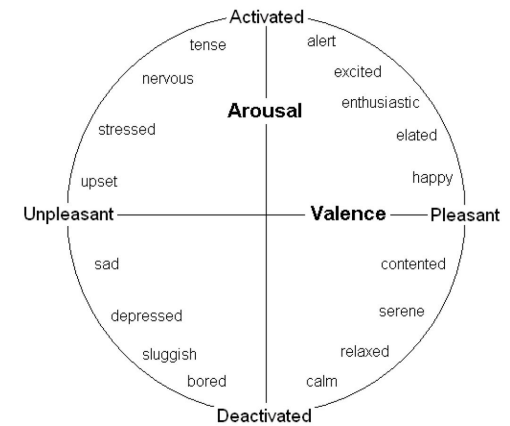
IN: physiological signals



Extract Features



Machine learning



Out: valence/arousal

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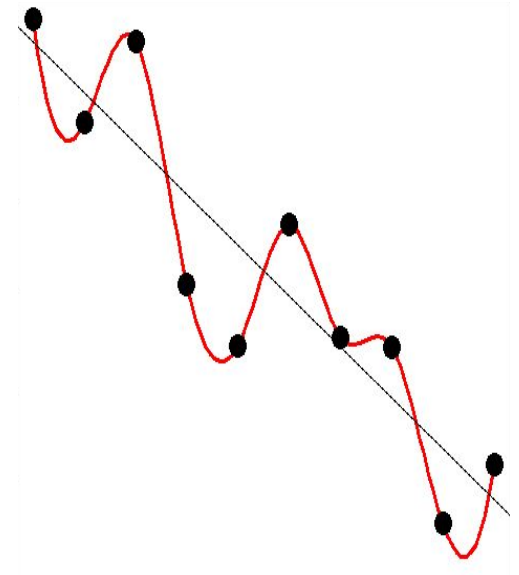
# Problem: not all features are good features



Disagreement on Features



Personal Differences



Overfitting

# Goal



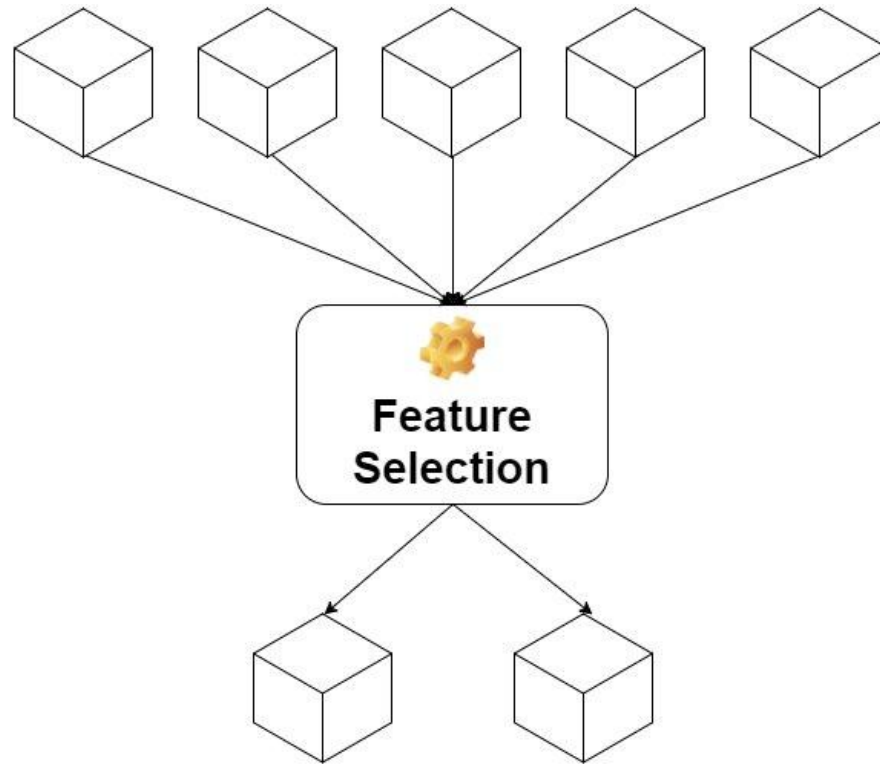
Find good features  
-> subject specific  
-> cross-subject



EEG vs non-EEg vs All

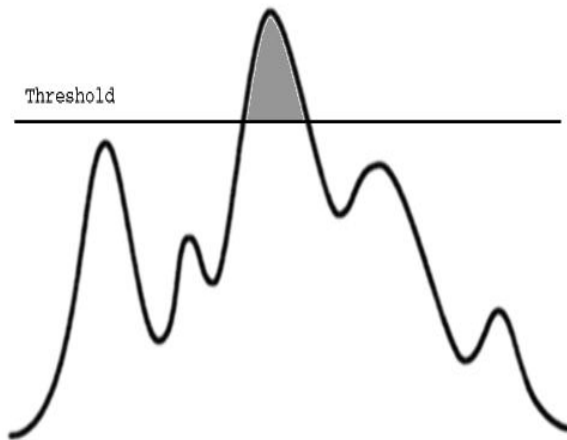
# Feature Selection: General Flow

IN:  
EEG and non-EEG features



OUT:  
Subset of features that can  
predict emotion

# Feature Selection Methods



Filter Methods

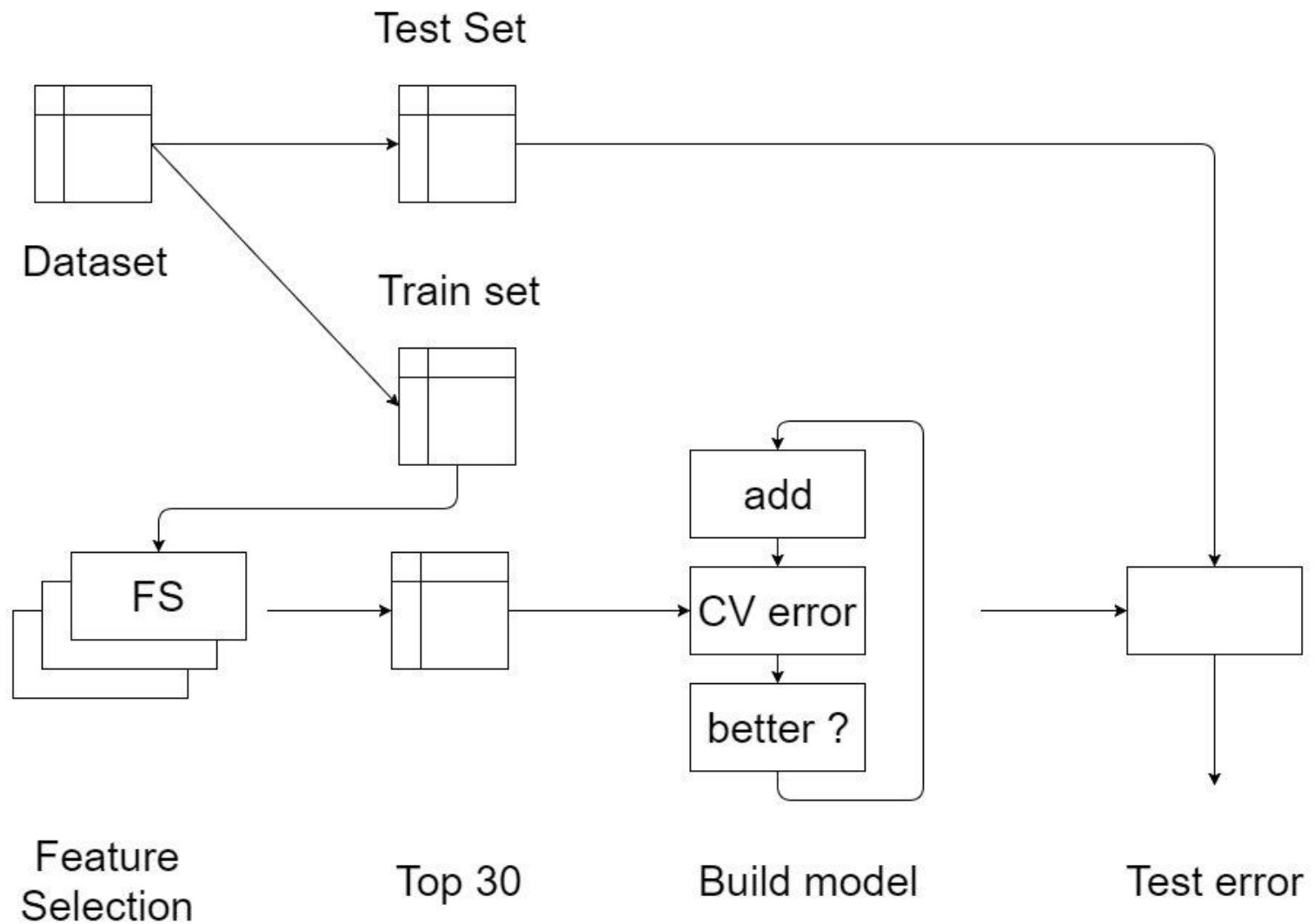


Wrapper Methods



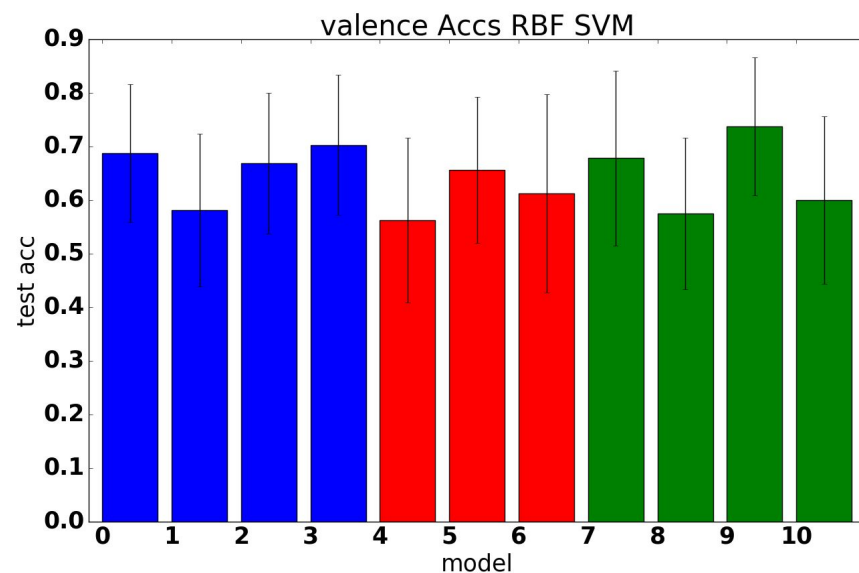
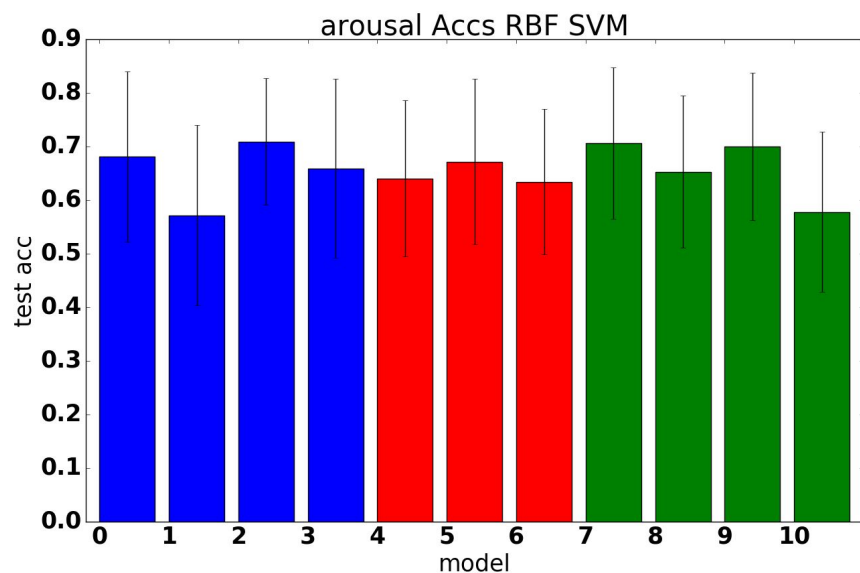
Embedded Methods

# Solution



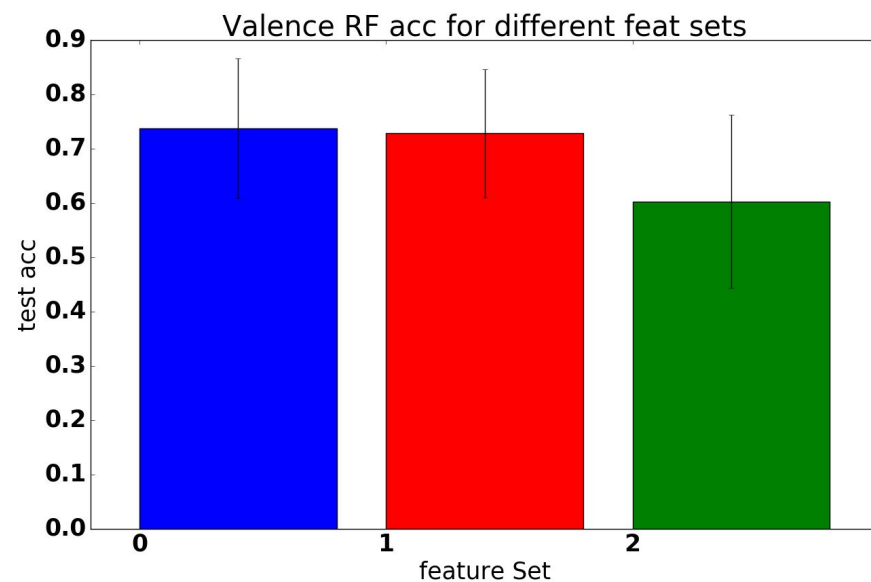
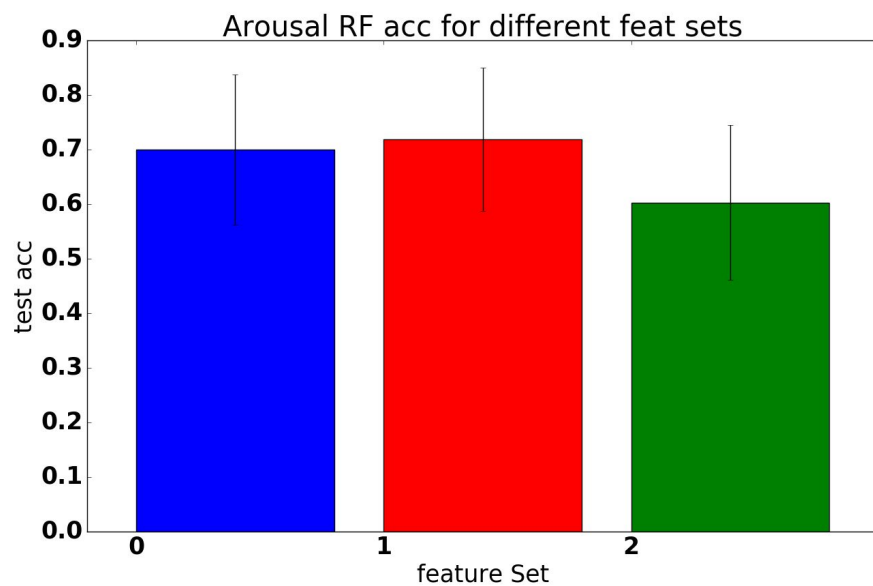


# Results



**Filter** - **Wrapper** - **Embedded**

# Results: non-EEG / EEG / ALL



**All - EEG - non-EEG**

# Next steps



Stability of the feature selection methods



Find features that work for all persons

# Questions

