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# HappyFeat, an interactive and efficient BCI Framework for clinical applications

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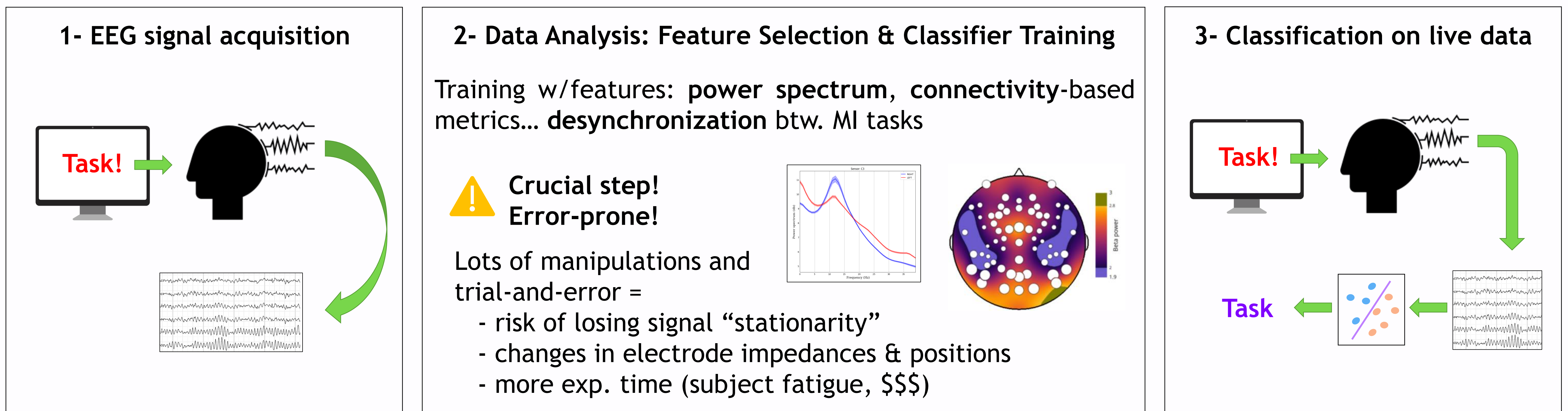
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# HappyFeat, an interactive and efficient BCI Framework for clinical applications

IEEE MetroXRaine Conference 2022 - Rome, Oct. 26<sup>th</sup>-28<sup>th</sup>

A. Desbois, T. Venot, M.-C. Corsi, F. De Vico Fallani

## Typical Motor Imagery (MI) experimental pipeline



HappyFeat is a Python-based framework for MI pipelines.



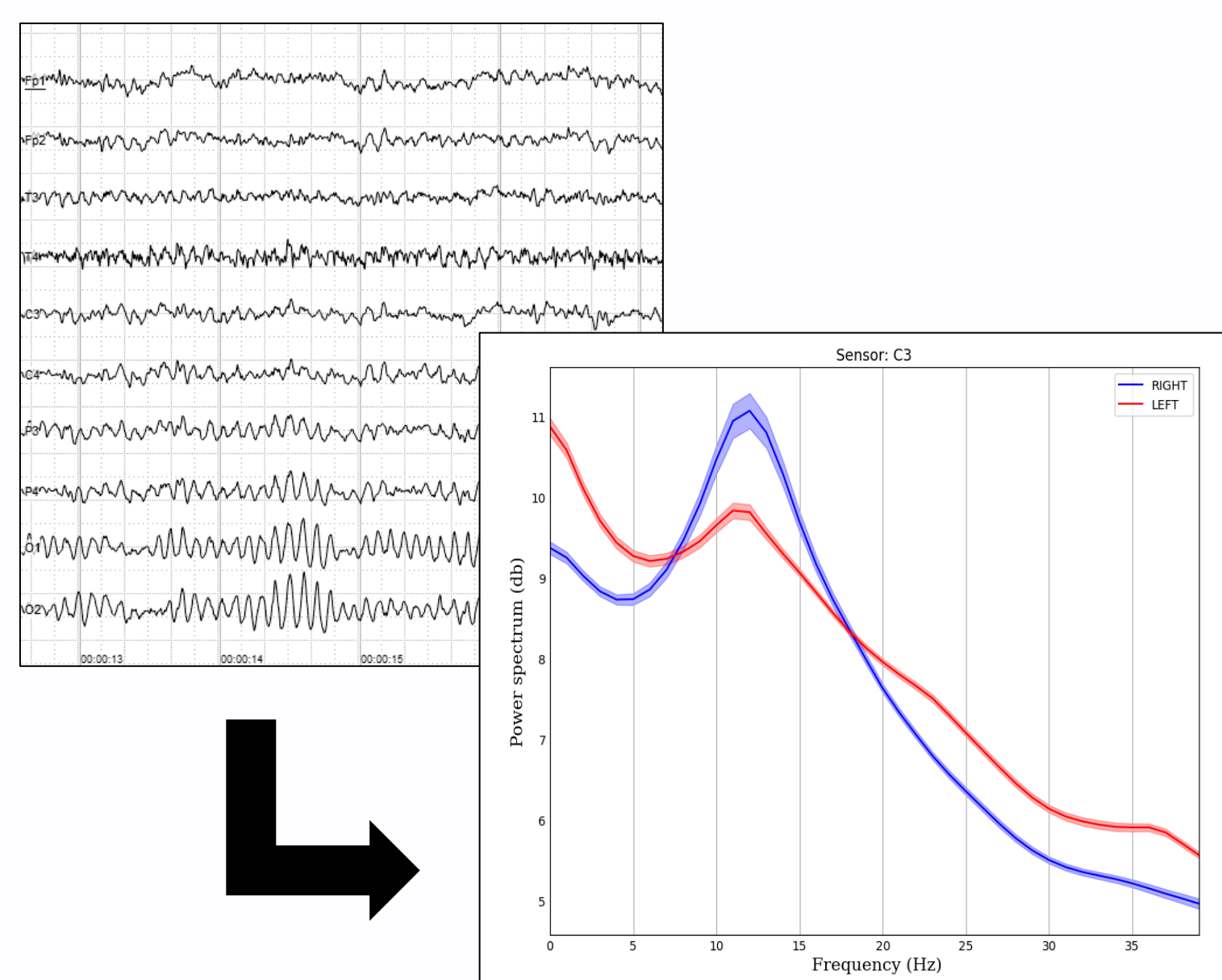
It focuses on facilitating the feature selection and training phases.

Analyze, select your features and train your classifier in less than 5 minutes!

### HappyFeat - Main Functionalities

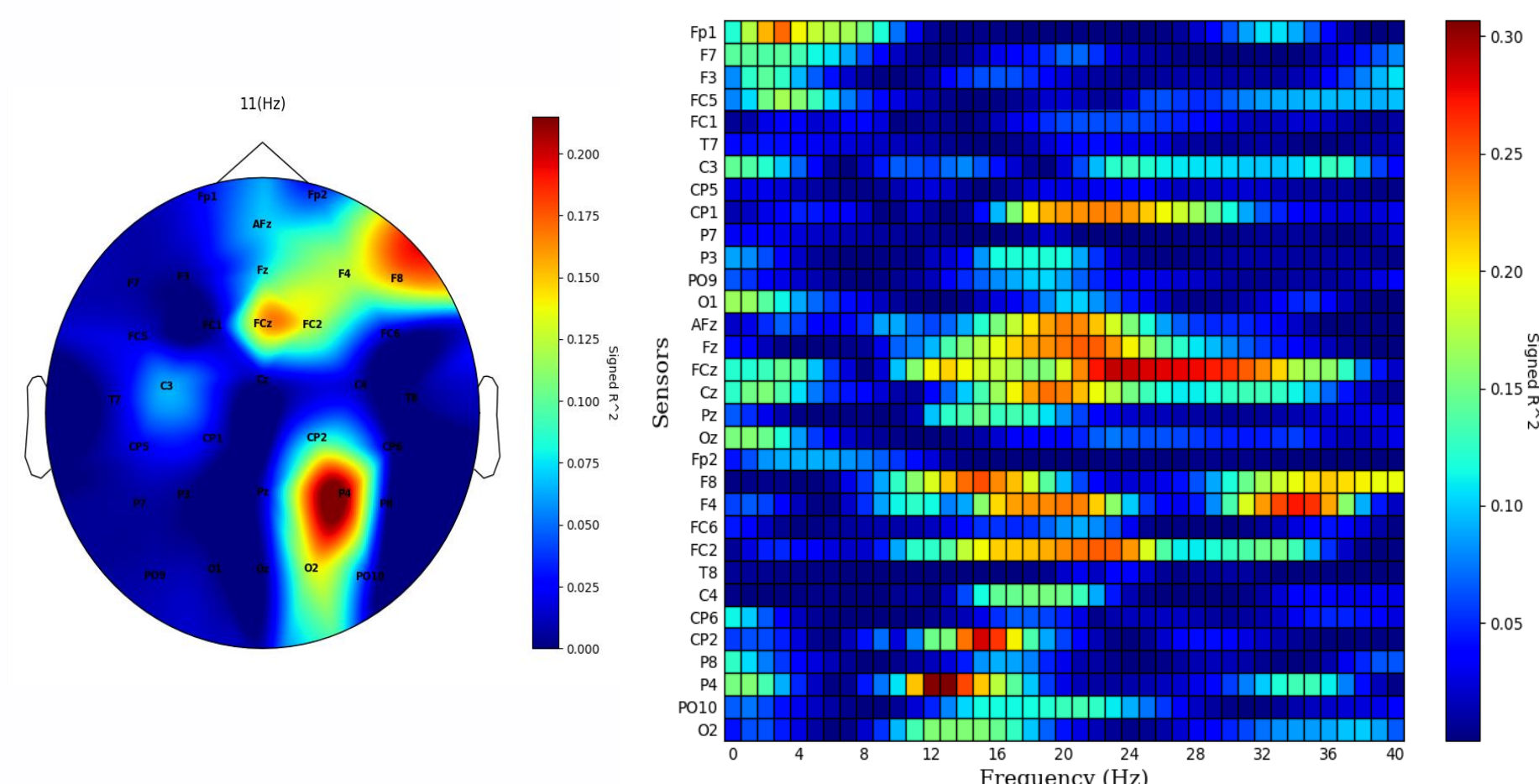
#### Extraction of classification features

- Signal analysis and pre-processing
- Using pre-recorded signals, or on-the-fly during the acquisition phase.



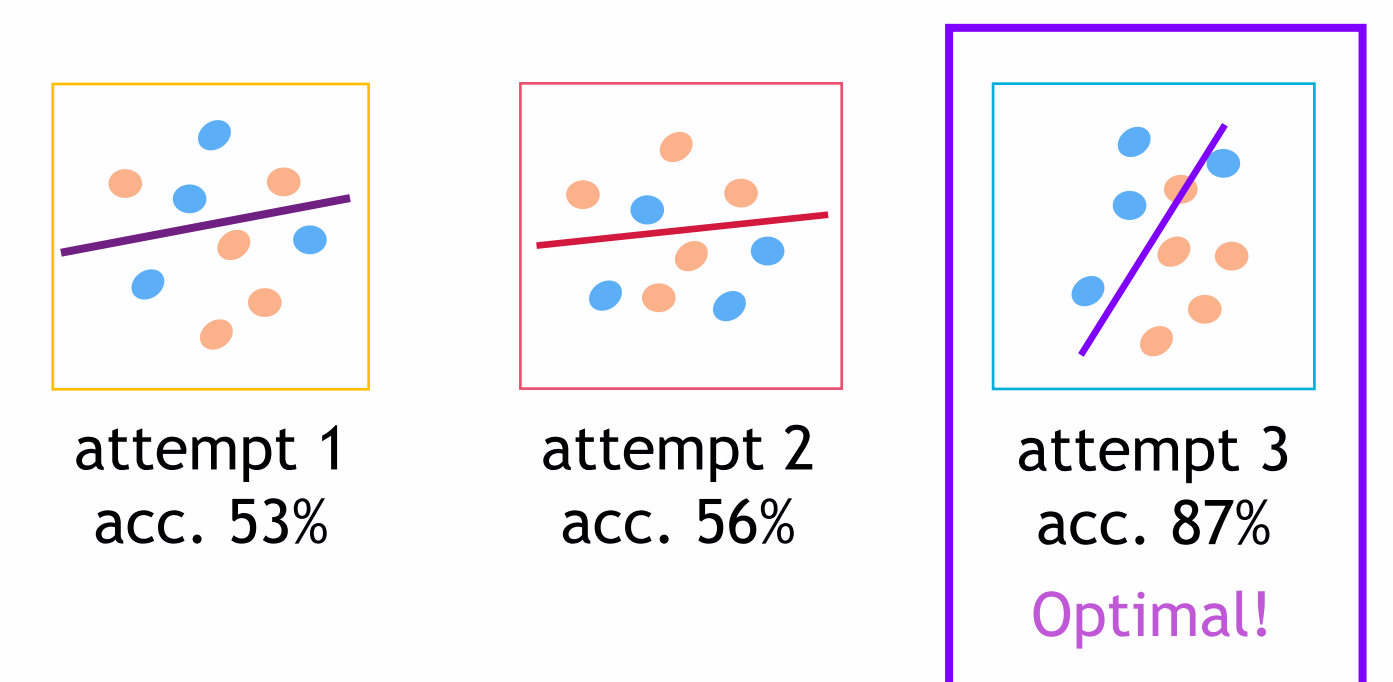
#### Visual analysis of spectral features

- frequency/channel map of  $R^2$  values
- «brain topography» of  $R^2$  values
- compared PSDs btw. MI conditions
- time/frequency ERD/ERS analysis



#### Classifier training, trials combinations

- Run various training attempts, in only a few clicks!
- Concatenate the trials from multiple recording sessions
- Automatically update classification weights in the “online classification” OpenViBE scenario



### Key Features & Mechanisms

- Clean, risk-free working environment, avoiding unnecessary and error-prone manipulations.
- Trial-and-error oriented workflow: all steps can be repeated quickly & as many times as needed.
- Everything available within a dashboard GUI
- OpenViBE is used in the background, as a processing engine. No scenario edition necessary: everything is automated!



### Final notes & Upcoming improvements...

- To be continued...
  - More pipelines & metrics based on connectivity (following research topics in Aramis / BCINET ERC)
  - Associated visualization tools
  - Choose from different classification algorithms
  - “Workspace” manager, to save/load parameters

First official release early 2023  
- stay tuned!

Development version:  
<https://github.com/BCI-NET/happyFeat>

