IMMERSE Kick-Off
WP 4

27.5.2021

This project has received funding from the European Union's Horizon 2020 research and innovation Programme under grant agreement 945263 (IMMERSE)

WP4 - Staff

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WP4 - Objectives

“In order to provide relevant, meaningful and personalized information for service users and clinicians, WP4 will fine-tune artificial intelligence (AI) models and develop the basic statistics to deliver personalized feedback adopted to routine healthcare delivery settings.”

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WP4 - Timeline

Split into two parts:

1. Basic simple statistics ready for implementation and visualization for the dashboard (first 9 months)
2. AI-based (multi-modal) big data integration (last 24 months)

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Simple Statistics

Display+collect basic measures from EMA time series data, e.g.

- Time series of (selected) EMA variables (joint display of various variables)

- Medians/means of variables taken across time

- Ordinal correlations between different EMA variables (e.g. Spearman's rho, Kendall's tau)

- Trends for selected time windows (e.g. is mood shifting in a certain direction)

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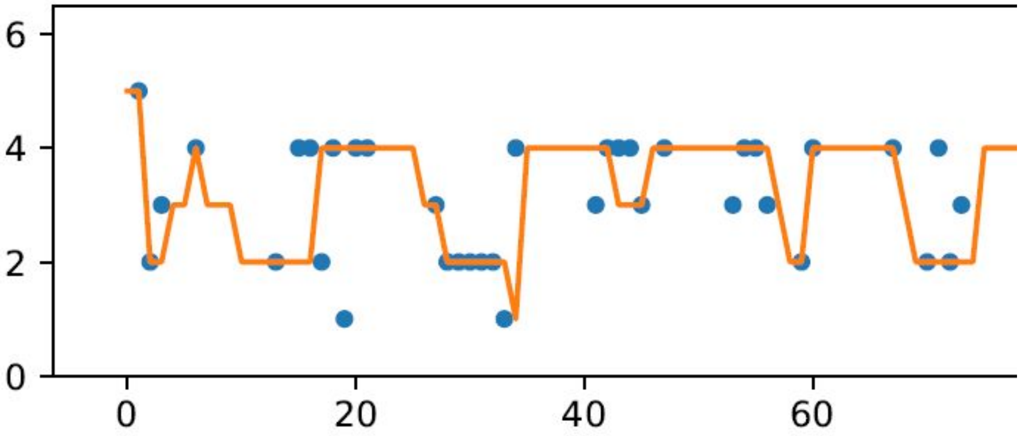
Simple Statistics



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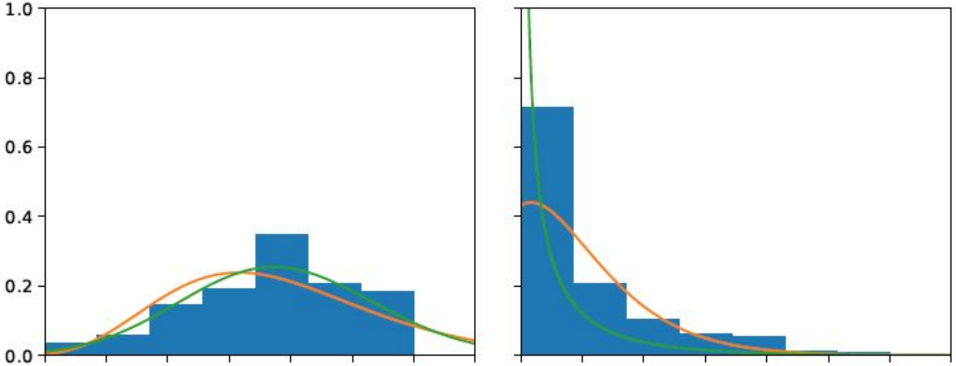
Simple Statistics

Histograms+distributions



Relaxed Scared

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More elaborate measures

Display+collect basic measures from EMA time series data, e.g.

- AR model with categorical or ordinal output distribution
- Display coefficient matrix for interactions and time dependence
- Infer trends from auto-regressive coefficients
- Simple one-step ahead predictions based on these models?

$\longrightarrow$ makes direct connection to latent RNN models that we are pursuing later

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Simple Statistics

Relaxed Scared Feeldown Angry Satisfied

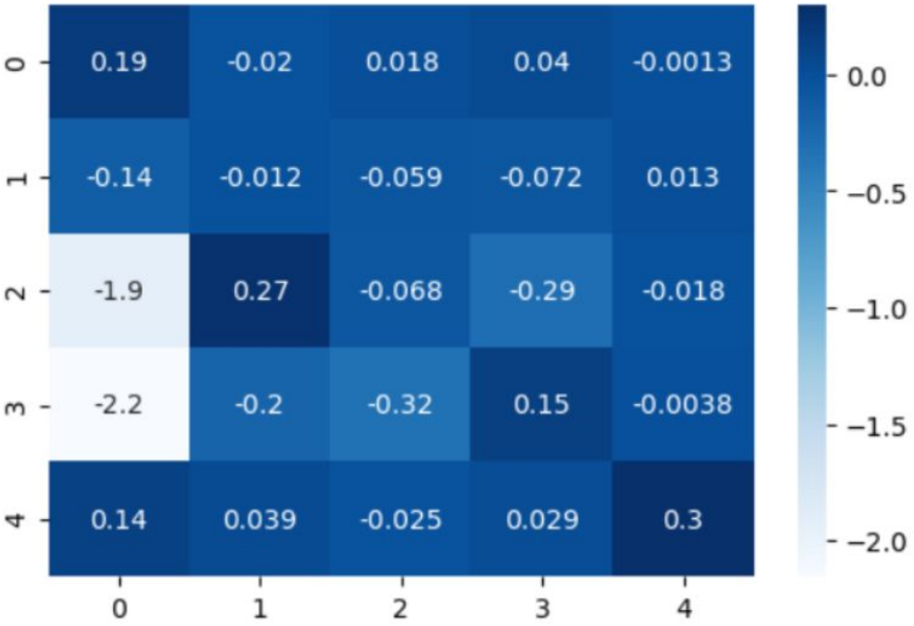
Relaxed

Scared

Feeldown

Angry

Satisfied



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Other issues

- Can we provide a baseline for comparison/ interpretation of individual scores, e.g. population CI?

- How to treat/ interpret "outliers" and missing data: May be the most informative data points!

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AI Models: Recurrent Neural Networks

Models of time series data (such as EMA, fMRI

$$\boldsymbol{z}_t = \boldsymbol{A}\boldsymbol{z}_{t-1} + \boldsymbol{W}\phi(\boldsymbol{z}_{t-1}) + \boldsymbol{C}\boldsymbol{s}_t + \boldsymbol{h}$$

$$\phi(\boldsymbol{z})_i = \max(0, z_i), i \in \{1, \ldots, M\}$$

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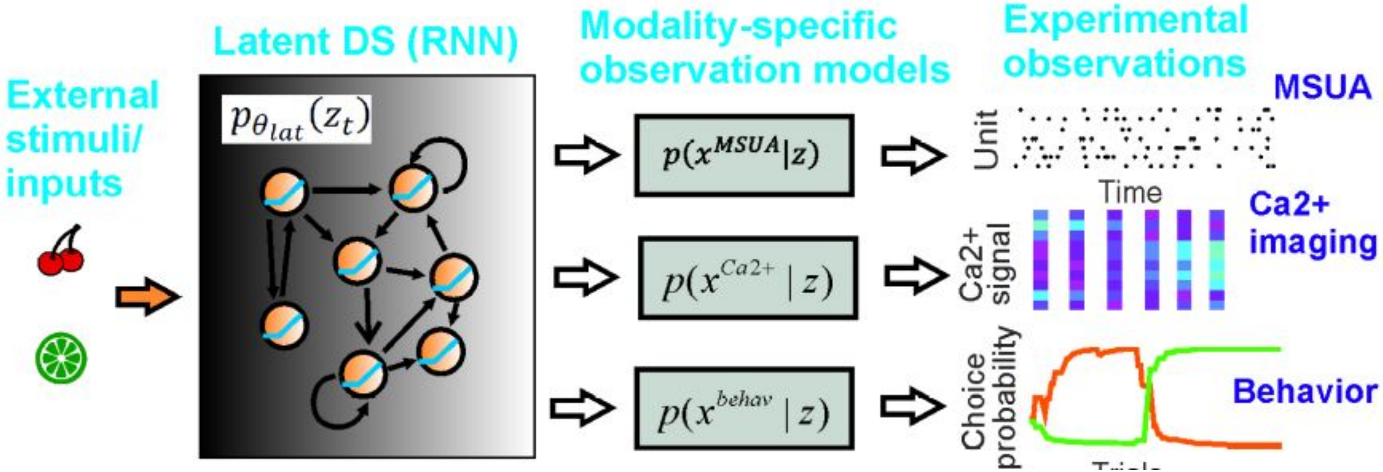
AI Models: Recurrent Neural Networks



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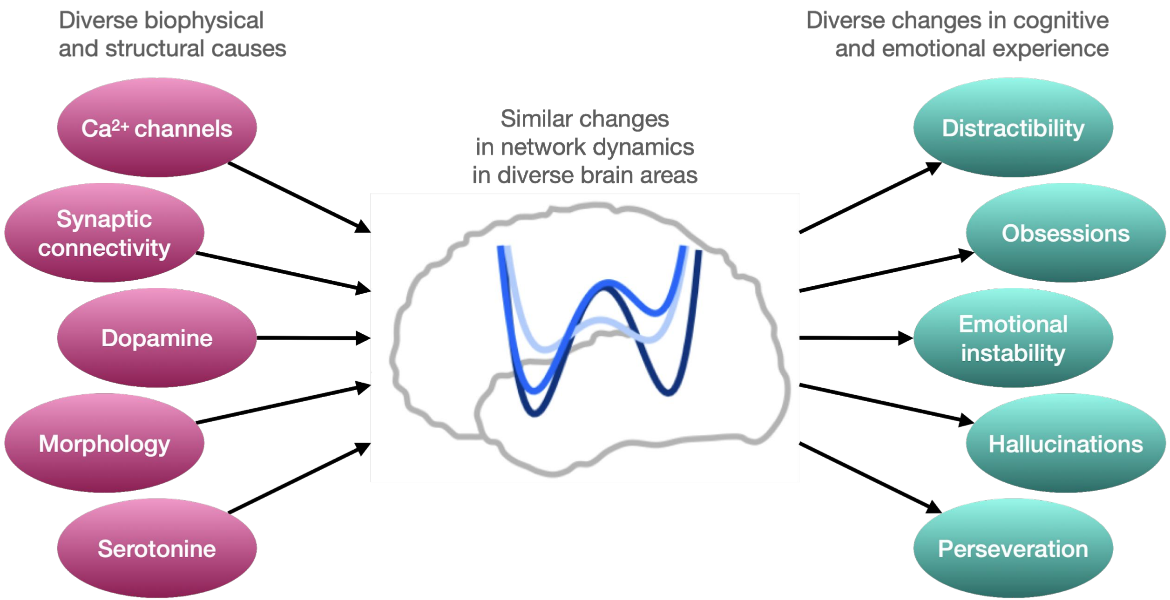
AI Models: Recurrent Neural Networks



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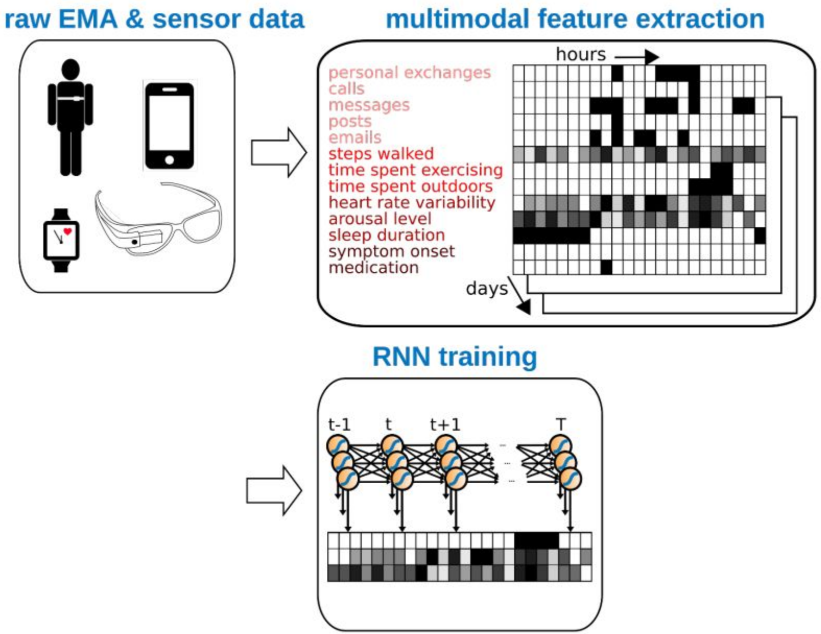
AI Models in Psychiatry



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AI Models of EMA Data

Capture complex trends, predict potentially meaningful shifts in mood

Problems: sparse data, many missing values

→ multimodal data integration to “fill in the gaps”

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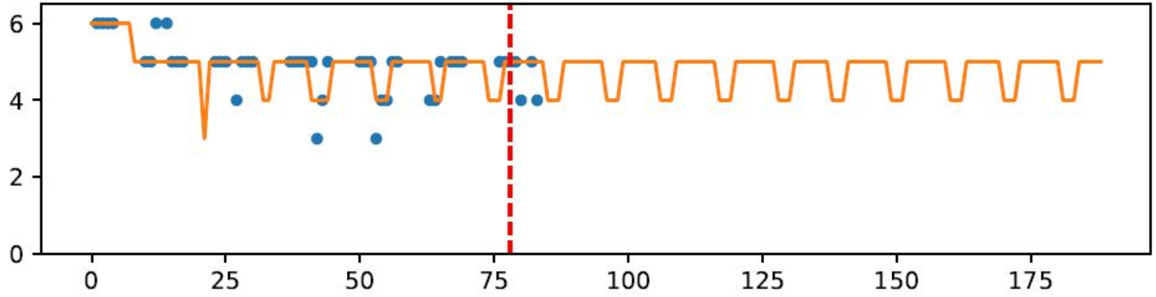
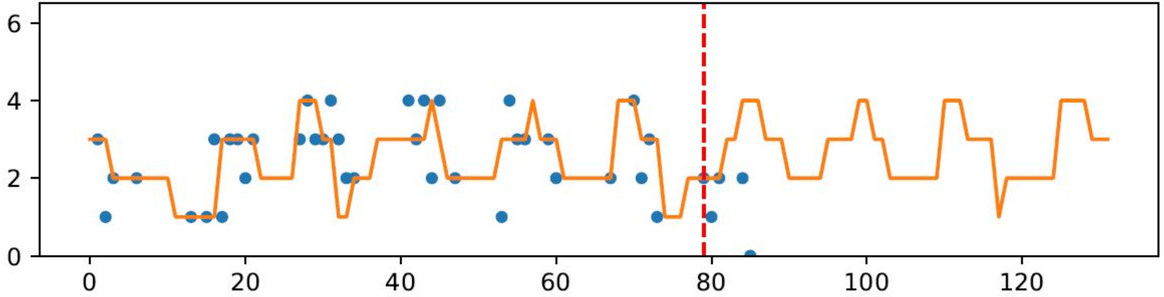
AI Models of EMA Data





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WP4 - Activities year one

- For the first 9 months we will focus on the basic statistics, read-in routines for the data etc.
- Currently working with similar EMA data from previous movisens-projects to develop RNN algorithms
- Milestone 1: deliver set of robust statistics in the proper format to movisens

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Questions/Collaborations

- What kind of information do we provide to movisens?

- Data interface (with WP3)

- Can we do (compute heavy) ML analysis without pulling the data?

- What kind of “simple statistics” are actually “simple” to understand?

- Schedule meeting with people planning the intervention (WP7) to discuss more detailed questions

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