

A NOVEL PSYCHIATRIC REGISTRY

A SYSTEM AND ITS UTILIZATION
FOR CLINICAL AND PHARMACEUTICAL RESEARCH

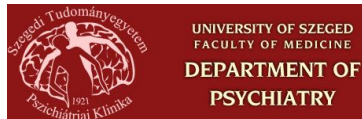
HU-MATHS-IN
Hungarian Service Network for
Mathematics in Industry and Innovations

CHALLENGES: Secure, clean and analyzable psychiatric patient data
PRODUCTIVE SECTOR: Psychiatry and data-driven Pharmaceuticals

The Industrial Problem

There has been a growing demand to create patient registries where the collected patient data is readily applicable for statistical analysis and data mining using standard and advanced methods.

University of Szeged



A decade of experience in mathematical modelling, advanced statistics, machine learning, and software development.
Strong experience in clinical aspects of clinical research medical documentation systems, long-term genetic and epidemiological research.

Takeda Pharmaceutical Company

A patient-focused, innovation-driven global pharmaceutical company, has a focused, world-class R&D innovation engine, making an impact on patients' lives by translating science into life-changing medicines.

Research group

Company

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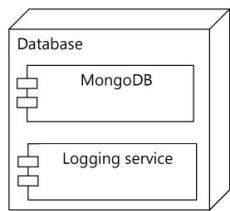
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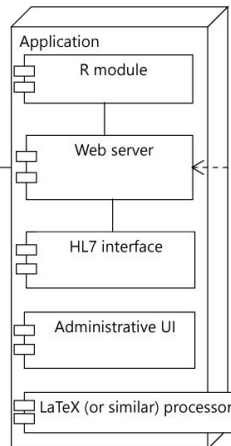
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Challenges & Goals

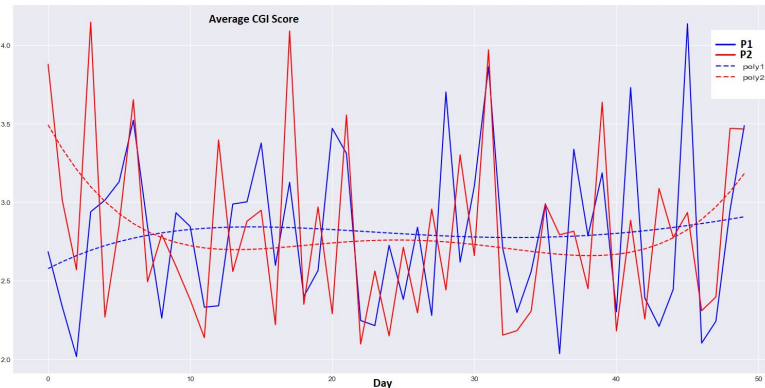
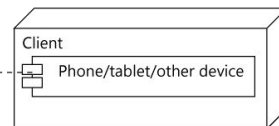
- Provide a possible solution through the integration of patient registries with the standard EHR patient administration systems.
- Apply novel data mining and machine learning techniques to investigate the connection of drug medication with the positive and negative symptoms of psychiatric patients.



Database-communication



HTTP



```
1 {
2   "uid": "323456791",
3   "name": "Pelda Felhasználó",
4   "formid": "panss",
5   "Positive_scale": {
6     "P1": 1,
7     "P2": 3,
8     "P3": 2,
9     "P4": 4,
10    "P5": 2,
11    "P6": 6,
12    "P7": 3
13  },
14  "Negative_scale": {
15    "N1": 6,
16    "N2": 2,
17    "N3": 4,
18    "N4": 2,
19    "N5": 4,
20    "N6": 2,
21    "N7": 5
22  },
23  "General_scale": {
24    "G1": 2,
25    "G2": 5,
26    "G3": 2,
27    "G4": 1,
28    "G5": 5,
29    "G6": 6,
30    "G7": 4,
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32    "G9": 3,
33    "G10": 6,
34    "G11": 4,
35    "G12": 7,
36    "G13": 4,
37    "G14": 3,
38    "G15": 1,
39    "G16": 5
40  },
41  "Supplementary_scale": {
42    "S1": 6,
43    "S2": 4,
44    "S3": 1
45  }
46 }
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Architecture of the registry (left) and example for collected data (above)

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Mathematical and computational methods and techniques applied

Data collected in the registry (2 month study):

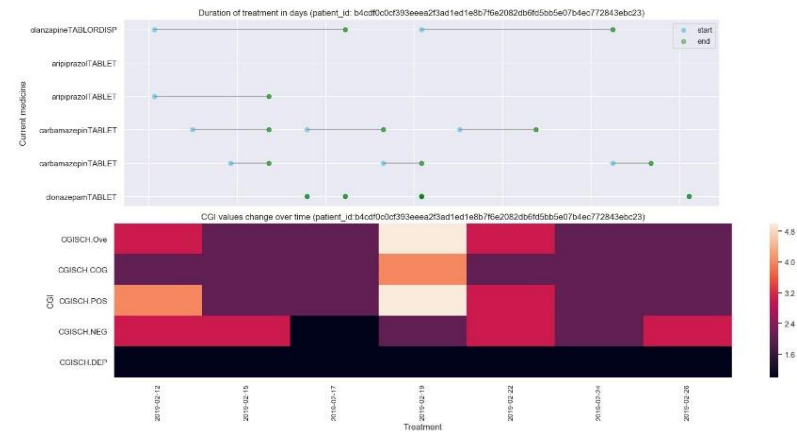
- PANSS (medical scale used to measure symptom severity of schizophrenic patients)
- CGI (measures illness severity (CGIS), global improvement or change (CGIC) and therapeutic response)
- Medication (Previous drug history and medication during hospitalization)
- Demographic data

Methods:

- Patient classification (Random forest, XGBoost)
- Correlation analysis
- Longitudinal data analysis

Variable / forms	Number of records
Patients	40
Demographic data	40
Previous medication (antipsychotics)	21
Progress notes (CGI, medication/dose changes, etc.)	23
PANSS	39

Some details of collected data



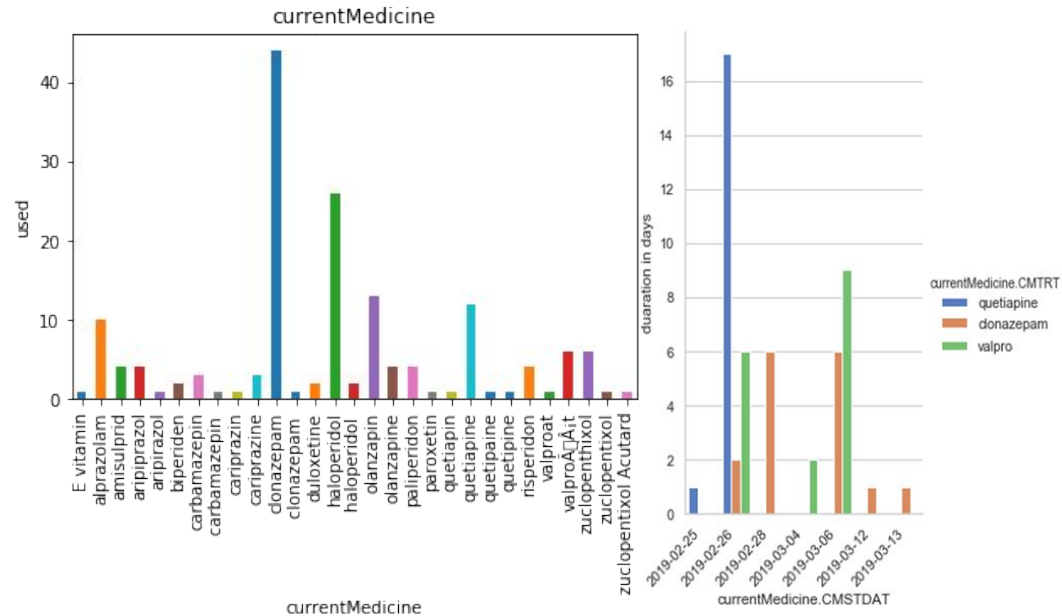
Treatment vs CGI – correlation and longitudinal analytics

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Results & Benefits to the company

- A novel, easy-to-use registry database (with EHR integration -- in progress)
- Potential of significant cost and time reduction in clinical trials
- High potential of post-marketing clinical follow up studies
- More accurate drug utilization data and its statistical analysis



Medication usage (right) and medication duration (left)

A novel, easy-to-use registry database and potential of significant cost and time reduction in clinical trials for pharma companies