Visualizing Clinical Data of Patients at the Child and Adolescent Psychiatric Emergency Unit

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Background

- Child and Adolescent Psychiatry Unit (CAPE) only short-stay psychiatric ward in the province for 17 year old or younger patients
- Common presentation: suicidality, depression, psychosis
- Ongoing large multi-disciplinary project to collect data on patients and use for suicide prediction

Motivation/Who

We posses a manually created database covering around 333 patients

Would like to visualize their data!

Vis would allow exploration to learn about out patients

Little previous work looking at this!

Users: hospital managers, psychiatrists, researchers

Motivation/Who

Example Questions:

- Do our patients follow expected patterns of illness eg more depression in the fall, mania in the spring?
- Does suicidal ideation/attempts increase at stressful points during the school year?
- Is medication use consistent with evidence-based guidelines?

Motivation/Who

Important consideration:

- Current physician workflows incorporate very little technology, and very little vis
- Doctors are very scared of complicated Vis!
- Our Vis must be very simple, at least initially

Data/What

Items = patients = 333

Attributes (Categorical, Ordinal, Quantitative)

- Demographics (gender, age, ethnicity, postal code)
- Date and reason for admission
- Medications and dose
- History:
  - Psychiatric history (diagnoses, previous admissions)
  - Medical history (diagnoses, surgeries)
  - Substance use history
  - Social history (family structure, foster care)
- Symptoms on admission
- Various clinical scale quantifying various symptoms

Data/What

Data is hierarchical! E.g.

- Diagnosis
  - Psychotic Disorders
    - Schizophrenia
    - Brief Psychotic Episode
  - Depressive Disorders
    - Major Depressive Disorder
    - Persistent Depressive Disorder
  - Anxiety Disorders
- Medications
  - Antidepressants
    - Fluoxetine
    - Sertraline
  - Antipsychotics
  - Sedatives
  - Stimulants

Data/What

Data also is also repeated for different time periods….

- Diagnosis
  - Diagnoses at admission
  - Diagnoses at discharge
- Medications
  - Medications in last 12 months
  - Medications on admission
  - Medications on discharge

Actions/Why

- **Consume**
  - Discover- definitely!
  - Present – maybe?
  - Enjoy – no!
- **Produce**
  - Probably not yet, maybe in the future?
- **Search**
  - Explore/browse more than others, but likely all search tasks.
  - We won’t be visualizing individual patients, just varying subsets
- **Query**
  - Identify, and summarize will be important. Compare will be too, unsure whether we’ll need a specific compare function

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Actions/Why

- Filtering + Compare will be a key features
- E.g. compare antidepressant medications of males vs females
- Users will likely not want to view all data at once
- Different users may have widely different use cases

Design Principles

- Must start as simple, not be intimidating, “not mathy”
- Must allow different use cases
- Must allow filtering/selection (both attributes and patients)
- Must be intuitive!

Implementing: Software

- Python/pandas for data processing
- Plotly python library for vis, at least initially
- Possible re-implementation in D3, if it's a.) possible with time constraints and b.) helpful/allows better vis

Implementing: Design

- Idioms: mostly pie charts and time-series line graphs
- Why? – Doctors are familiar

Implementing: Design

- Initial view is of a line graph, pie chart
- Users can click and drag part of either into a new pie chart/line graph, which filters for subjects included in that piece of the pie
- Hierarchical tool then allows users to select what attributes the line graph or pie chart shows
- Can then iterate to more levels

Showcase!

- Let’s show you both a paper and pen version, and what we have so far