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
We posses a manually created database covering around 333 patients
Would like to visualize their data!
Vis would allow exploration to learn about our patients
Little previous work looking at this!
**Users:** hospital managers, psychiatrists, researchers
Motivation/Who

Example Questions:

• Do our patients follow expected patterns of illness e.g. more depression in the fall, mania in the spring?
• Is medication use consistent with evidence-based guidelines?
• Do psychotic disorders increase with age?
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
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.

• **Query**
  • Summarize, compare important
Actions/Why

- Filtering is a key feature
- Users will likely not want to view all data at once
- Different users may have widely different use cases
**Data/What**

**Items** = patients = 333

**Attributes** (Categorical, Ordinal, Quantitative)

- Diverse dataset!
- For this project, decided to focus on most important
- Privacy considerations also limited data selection
Quantitative/Ordinal Attributes
• Age
• School grade
• Month of admission

Binary Attributes
• Prior admission?
• Transferred from a different hospital?
• Psychiatrist follow up?
• Brought in by police/parents/etc
Data/What

Categorical Attributes

History:
• Psychiatric and other diagnoses
• Medications
• Substance use (alcohol, cocaine...)
• Ethnicity
Data is hierarchical! E.g.

- **Diagnosis**
  - Psychotic Disorders
    - Schizophrenia
    - Brief Psychotic Episode
  - Depressive Disorders
    - Major Depressive Disorder
    - Persistent Depressive Disorder

- **Medications**
  - Antidepressants
    - Fluoxetine
    - Sertraline
  - Antipsychotics
  - Sedatives
  - Stimulants
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
Let's go through Demo
Scalability

• Attributes
  • Using the drop down menu, additional views could be added
  • Nesting could allow more
  • Likely could fit as many as one could realistically want in clinical data
  • Different levels of diagnosis/medication hierarchy could be used
Scalability

• Items
  • We do not show individual patients
  • Vis could show data based on as many patients as desired
  • Computationally would need optimization, expect could support as many as could feasibly want

• Vis could likely handle clinically relevant number of attributes/items
Lessons Learned

• PF-20: premature design commitment: consideration space too small/ PF-22 non-rapid prototyping
  • Too much time before first vis’ing
  • Once vis’d, design choices were much more obvious
  • Iteration much better than implementing all at once
  • Tamara told us so 😊
  • Due to changing tools, wanting to perfect design
Lessons Learned

Scope:
• Next time, start with very, very small range of data to vis
• And then build from there!

Tool choice:
• Tableau allowed some quick and pretty vis
• Should have done more pre-processing with Python (pivots uuughhh)
• Tough for group projects due to version control, etc
Future Work

• Extending the current vis
  • More attributes
  • More filtering/persistent filtering
  • Allowing an explicit compare function

• Automation
  • Eventually goal is to use data from an NLP pipeline being developed
  • Would take clinical documents as input, output this vis
  • Would need extensive work on automatically categorizing, cleaning, etc.
Questions?

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