NOPIOID:
Identification And Visualization Of High Residual OPIOID Prescribers

CSE6242- DATA & VISUAL ANALYTICS

TEAM 122

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1. Objective

- Identify medical providers prescribing opioids, above the expected levels

- Provide insight into the factors driving high residual Opioid prescriptions

2. Limitations of current practices

- Fails to identify potentially inappropriate opioid prescribing (PIP) providers.

- Existing predictive analysis tends to focus on patient basis, based on their risk factors [1].

  - Enable predictive analysis on providers data in conjunction with prescription data.

[1] https://biodatamining.biomedcentral.com/articles/10.1186/s13040-019-0193-0

Innovation and Who Cares?

3. **Innovation**
● Identify providers who prescribe opioid above expected levels.
  ○ Based on the Prescribers attributes such as geographical location, education, distance from peers and other factors [2].

4. **Who cares?**
● Facts -
  ○ According to CDC, in 2017, around 68% of more than 70K drug overdose deaths involved an opioid [3].
  ○ Opioid related harm costs about $78 billion annually[4] to the US
● Identifying opioid prescription providers can help policy makers target resources at specific locations to reduce opioid overdose related risks.

[2] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6258178/
[3] https://www.cdc.gov/drugoverdose/epidemic/index.html
[4] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6090487/pdf/10.1177_1178221818784294.pdf

Measure success, Risks and Cost

5. **Measuring success**

- Provide interactive insights about opioid prescribing providers

  - To enable users to identify high residual prescription writers

6. **Risks and payoffs**

- Study is limited to the US population aged 65 and above.

- Evidence shows opioid prescription providers is becoming less significant of solving drugs overdose issues [5].

7. **Cost implications**

- Planning to use existing tools to analyze the data

- Developing our model and analyzing it is not expensive

[5]https://www.nytimes.com/interactive/2019/07/17/upshot/drug-overdose-deaths-fall.html

8. **Execution duration**

- 9 weeks

9. **Exam check**

- **Midterm - Develop a standardized dataset and draft model**

  ○ Develop relevant dataset to analyze

  ○ Identify attributes to predict and draft models

- **Final - Rigorously train the model and provide an interactive visualization interface**

  ○ Develop a good trained model with relevant supporting analysis

  ○ Model explanation and targeting landscape in an easy-to-use interactive interface

Planned Activities

Week	Activity
Wee 1-2	Develop a **standardized** training **dataset** based on provider data from the CMS API [6].
Week 3-4	Use **feature extraction** methods like vTreat to encode categorical data in a format suitable for predictive modeling [7].
Week 4-5	• Use various **clustering algorithms** to analyze the data [8]. • Helps to **understand relationships** between provider attributes and prescription rates.
Week 5-6	**Develop a model** to estimate prescription rate based on provider attributes.
Week 6-9	• **Visualize** the outputs of predictive model. • Employ model interpretation methods like SHAP [9] and LIME [10]. • Enable identification of opioid PIP providers geographically using visualization toolkits such as D3.js, Plotly and ECharts [11].

[6] https://dev.socrata.com/foundry/data.cms.gov/6wg9-kwip
[7] https://arxiv.org/abs/1611.09477
[8] http://www.cs.toronto.edu/~hinton/absps/tsne.pdf
[9] https://arxiv.org/abs/1705.07874
[10] https://arxiv.org/abs/1602.04938
[11] https://www.sciencedirect.com/science/article/pii/S2468502X18300068

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Thank You!