PeopleRX: Drug Recommendation System

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Metis

Client

- Reputable pharmacy brand
- Expanding online healthcare services
- Increasing consumer engagement online

Motivation

Fast and efficient treatment without:

1. Unpredictable painful side effects
2. Long trial and error period
3. Long clinical trial wait time
4. Uncertainty
5. Human error
6. Costs

Data

212,850 data points with at least 6 features

	A	B	C	D	E	F	G
1		drugName	condition	review	rating	date	usefulCount
2	206461	Valsartan	Left Ventricular Dysfunction	"It has no side effect, I take it in combinati▶	9	May 20, 2012	27
3	95260	Guanfacine	ADHD	"My son is halfway through his fourth weel We have tried many different medications▶	8	April 27, 2010	192
4	92703	Lybrel	Birth Control	"I used to take another oral contraceptive, The positive side is that I didn't hav▶	5	December 14, 2009	17
5	138000	Ortho Evra	Birth Control	"This is my first time using any form of bir▶	8	November 3, 2015	10

Project Design

1 Clean Data + Explanatory Data Analysis (EDA)

2 Document-Term Matrix using CountVectorizer

3 Topic-Modeling using Latent Semantic Analysis (LSA) via TruncatedSVD

4 Iterate steps 2 and 3 for model topic accuracy

5 Recommendation using Content-Based Filtering

6 Web application using Streamlit

EDA Findings

- Top 6 most common medical conditions:
  1. Birth control
  2. Depression
  3. Pain
  4. Anxiety
  5. Acne
  6. Bipolar Disorder

Topic Modeling Refinement

Before (1st iteration)

```
Topic 0
im, day, taking, ive, mg

Topic 1
mg, pain, day, anxiety, sleep

Topic 2
pain, period, days, got, birth

Topic 3
im, ive, pain, years, feel

Topic 4
day, im, days, period, like

Topic 5
mg, day, ive, control, birth
```

Custom Stopwords

- like, just, ive, im, got, day, days, time, times, years, weeks, took, taking, taken, side effects, get, month, went, ago, feel, felt, one, hours, using, started, back, dont, since, life, never, really, medicine, dose, much, still, doctor, dr, meds.

After (20th iteration)

```
Topic 0
pain, period, weight, control, bad

Topic 1
pain, sleep, severe, night, relief

Topic 2
pain, period, birth, control, birth control

Topic 3
weight, gain, lbs, weight gain, lost

Topic 4
control, birth, birth control, anxiety, depression

Topic 5
acne, skin, face, use, clear
```

Topic Modeling Results

1. Period

2. Pain

3. Birth control

4. Weight

5. Mood (Anxiety/Depression)

6. Acne

Topic Validation

EDA Findings

- Top 6 most common conditions:
    1. Birth control
    2. Depression
    3. Pain
    4. Anxiety
    5. Acne
    6. Bipolar Disorder

Topics Modeled

- Top 6 review complaint topics:
    1. Period
    2. Pain
    3. Birth control
    4. Weight
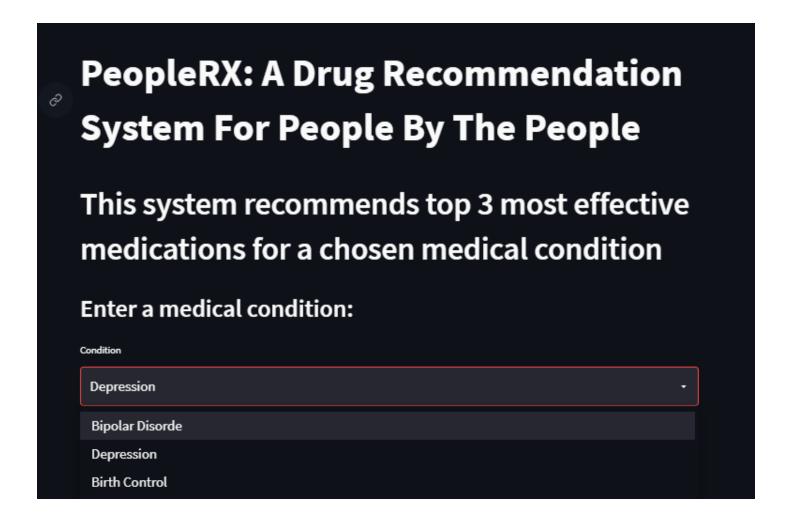   5. Mood (Anxiety/Depression)
    6. Acne

Drug Recommendation Methods

Pairwise_distances with 3 PCA features

- More accurate results

- Faster

- Input condition: "Birth Control"
  1. Ortho Tri-Cyclen Lo
  2. Seasonique
  3. Depo-Provera

Cosine_similarity with topic-model matrix

- Mediocre results

- Not as fast

- Input condition: "Birth Control"
  1. Sprintec
  2. Quetiapine (for mood disorders)
  3. Mirena

Streamlit Web Application

PeopleRX: A Drug Recommendation System For People By The People

This system recommends top 3 most effective medications for a chosen medical condition

Enter a medical condition:

Condition

Depression

Bipolar Disorde
Depression
Birth Control

Future Work

- Integrate recommender python code into Streamlit web application

- Compare with TFIDF, LDA, NMF, VADER, and CorEx for performance

Thank you!