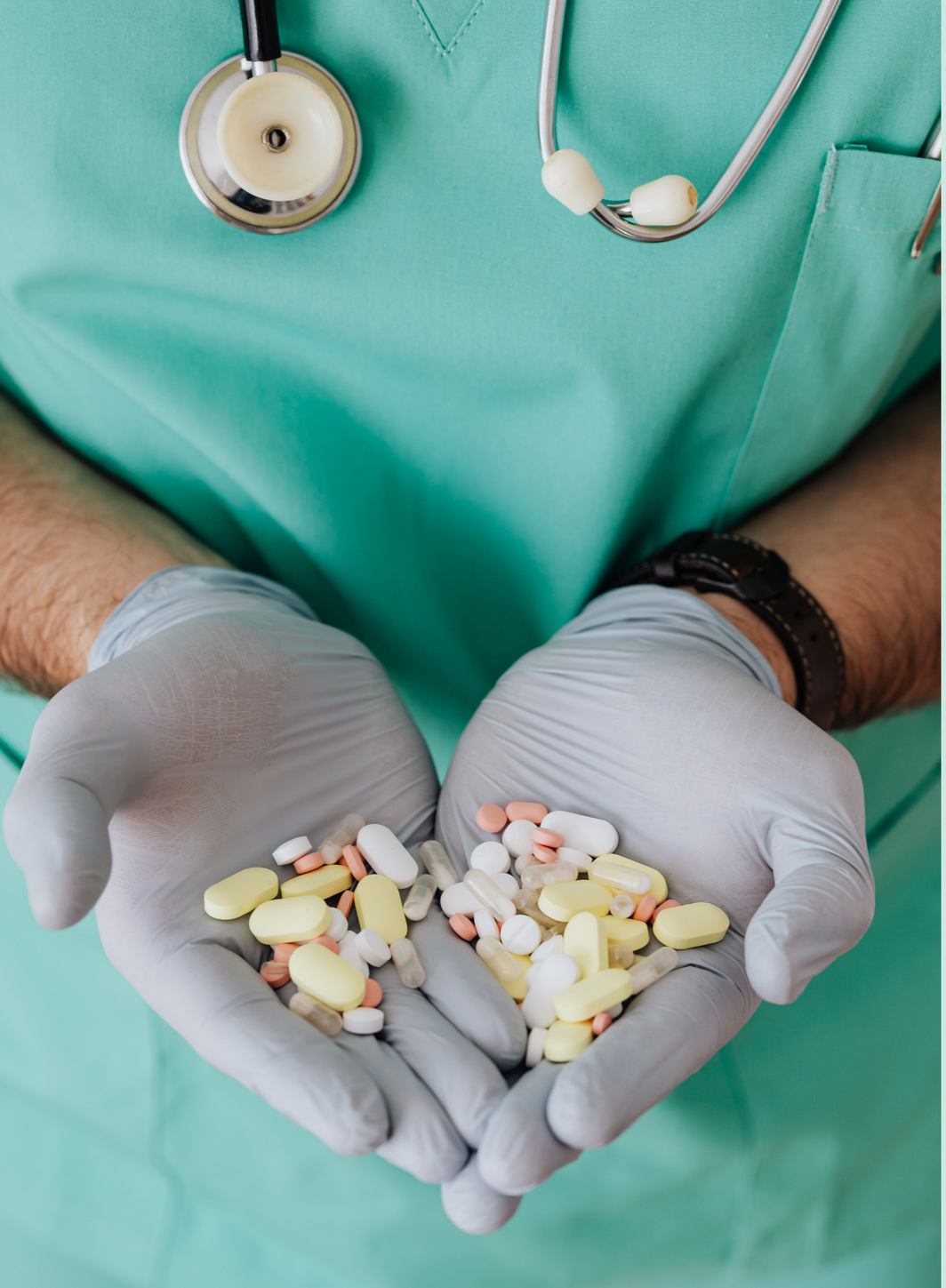

Sentiment Analysis of Drug Reviews

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Ironhack DA, 2022-I

Healthcare meets IT

Tools such as sentiment analysis allow collecting a big amount of information about the **safely** and **effectiveness** of drugs, compared to what could be gathered through highly structured clinical trials

Features in the dataset

DRUG
(CATEGORICAL)

CONDITION
(CATEGORICAL)

REVIEW
(TEXT)

PREDICTOR

USEFUL_COUNTS
(NUMERICAL)

RATING [1-10]
(NUMERICAL)

TARGET VARIABLE

CONVERTED TO
BINARY 0/1

Main predictive feature: patient reviews

POSITIVE REVIEW

"Absolutely saved my life. I've tried numerous drugs over 15 years and this is a miracle. No side effects whatsoever. I feel better than I ever have in my life".

NEGATIVE REVIEW

"Absolutely terrible experience on Tirosint - landed in ER with chest pains, dizziness, extremely disoriented."

Drug types and medical conditions in the dataset

3,199
UNIQUE DRUGS

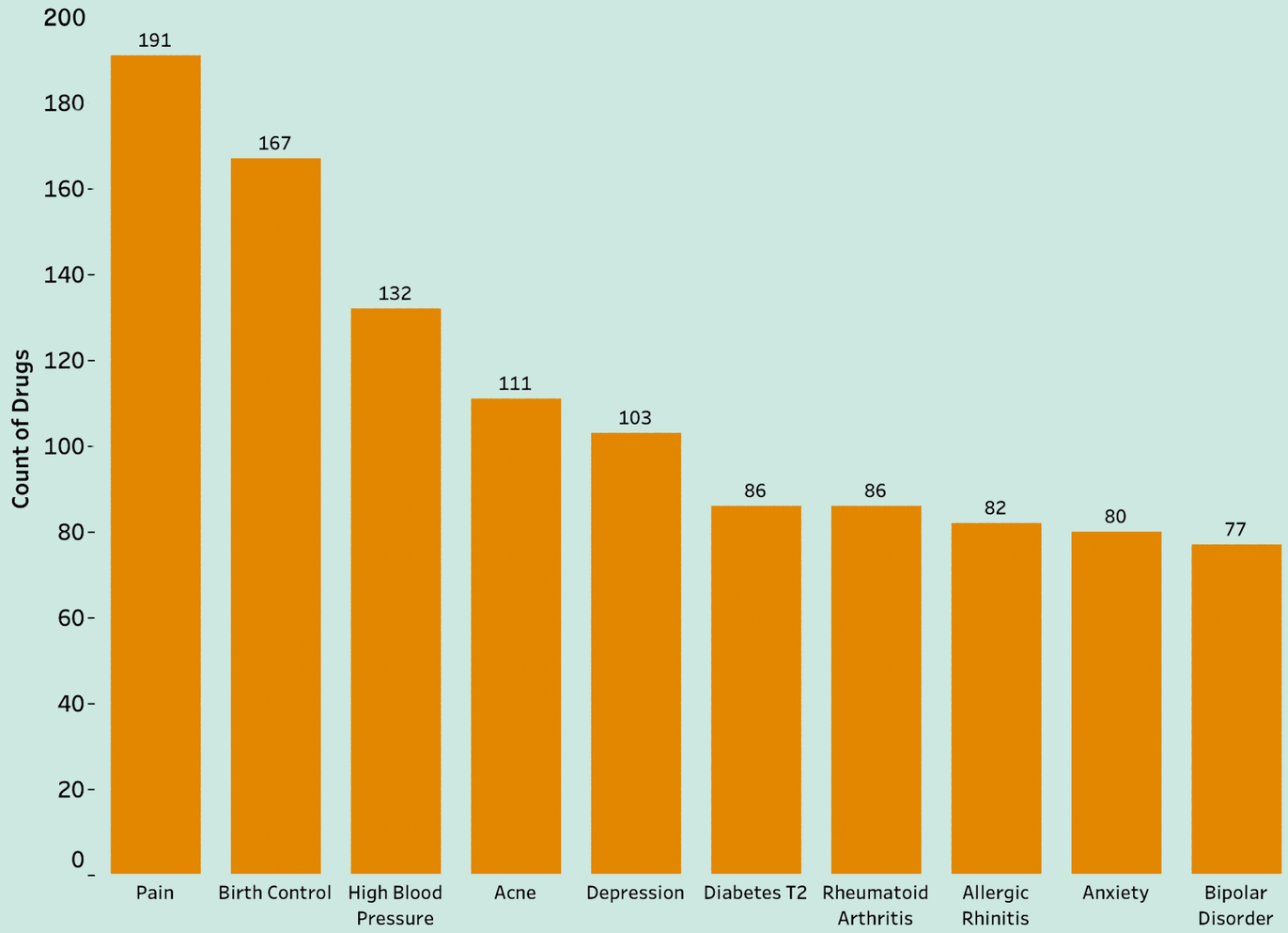
837
UNIQUE CONDITIONS

130,285
UNIQUE REVIEWS

* COLLECTED OVER A 9 YEAR TIME SPAN (2008-2017)

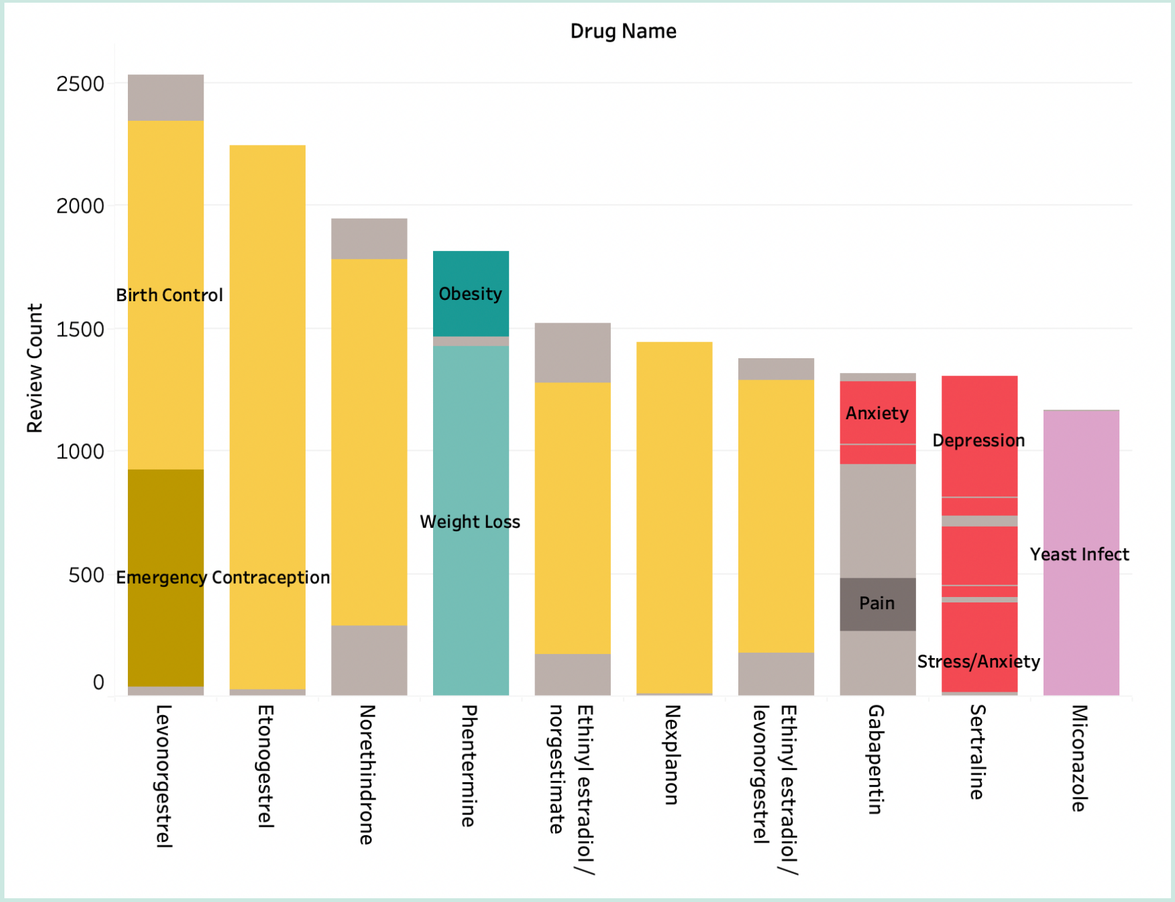
Drug types and medical conditions in the dataset

Top 10:
Drug count per Condition



Drug types and medical conditions in the dataset

Top 10 reviewed drugs, with most common target Condition



Most common conditions targeted by top 10 drugs in the dataset:

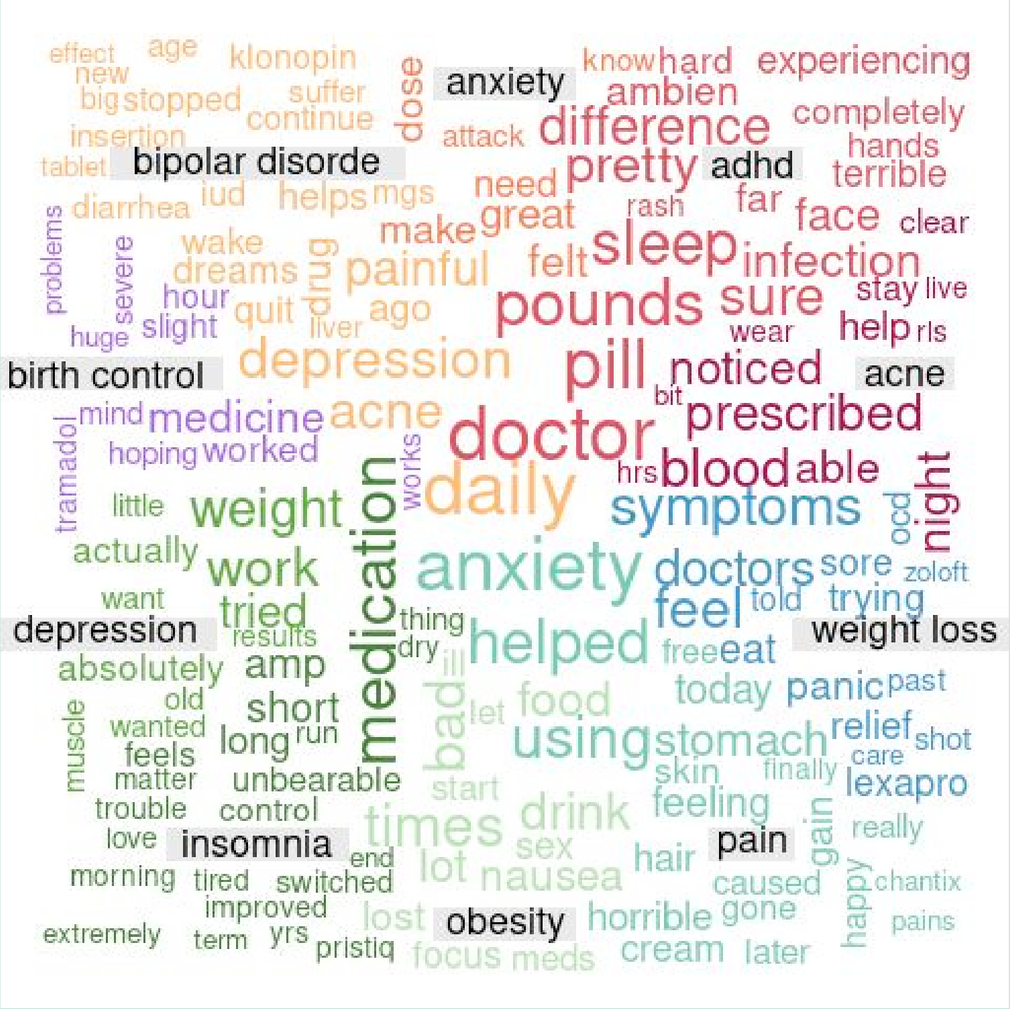
- Birth control and termination
- Mood disorders
- Weight loss

Drug recommender

The dataset allows users to find the best and worst drugs for the condition they are suffering from

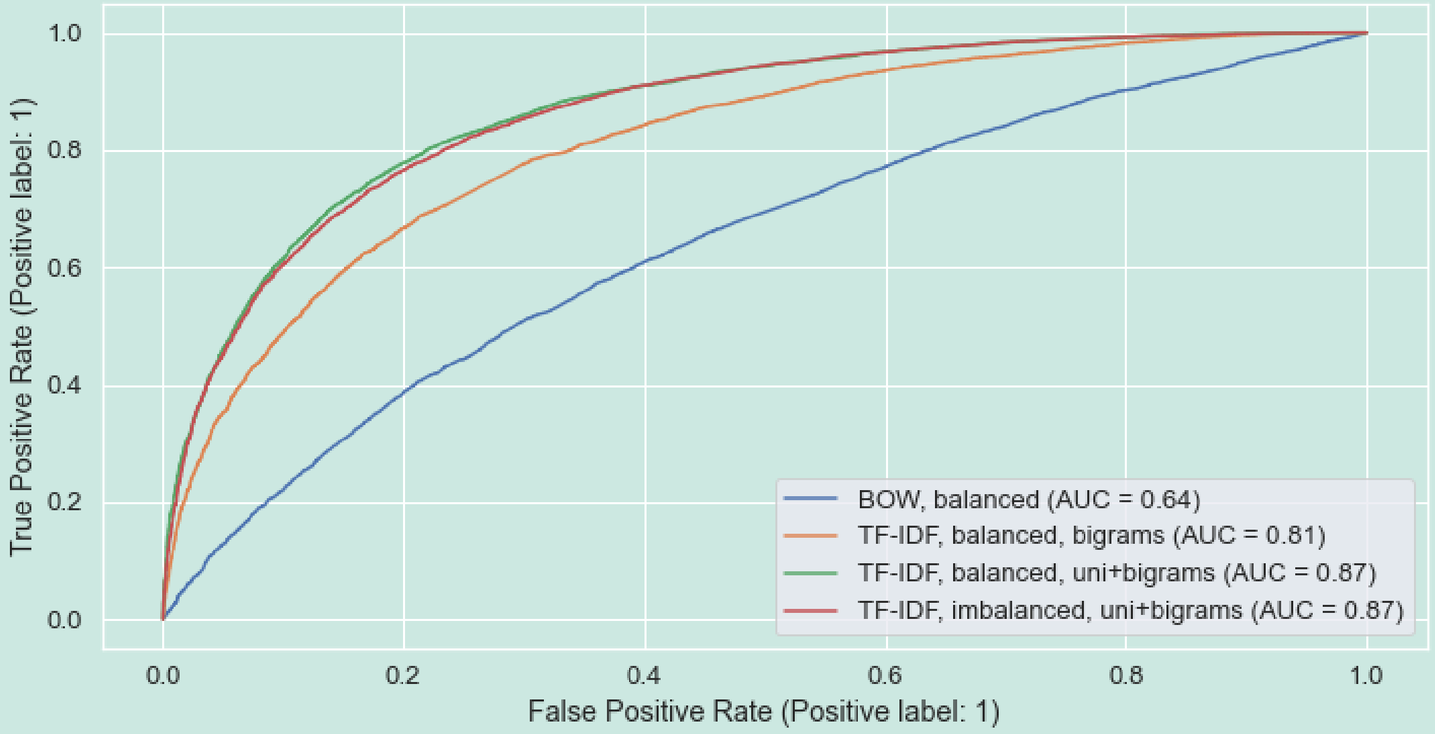
Word Clouds

Most frequent words associated with top 10 Conditions



Model Comparison

- Using Random Forests



Balanced

Results obtained for the TRAIN SET
==========
The Cohen's Kappa is: 0.96

	precision	recall	f1-score	support
0	0.98	0.98	0.98	34967
1	0.98	0.98	0.98	35194
accuracy			0.98	70161
macro avg	0.98	0.98	0.98	70161
weighted avg	0.98	0.98	0.98	70161

==========
Results obtained for the TEST SET
The Cohen's Kappa is: 0.57

	precision	recall	f1-score	support
0	0.79	0.79	0.79	8884
1	0.78	0.78	0.78	8657
accuracy			0.79	17541
macro avg	0.79	0.79	0.79	17541
weighted avg	0.79	0.79	0.79	17541

Imbalanced, more 1s!

Results obtained for the TRAIN SET
==========
The Cohen's Kappa is: 0.99

	precision	recall	f1-score	support
0	1.00	0.99	0.99	35026
1	0.99	1.00	1.00	69202
accuracy			1.00	104228
macro avg	1.00	0.99	0.99	104228
weighted avg	1.00	1.00	1.00	104228

==========
Results obtained for the TEST SET
The Cohen's Kappa is: 0.46

	precision	recall	f1-score	support
0	0.84	0.45	0.58	8825
1	0.77	0.96	0.85	17232
accuracy			0.78	26057
macro avg	0.81	0.70	0.72	26057
weighted avg	0.80	0.78	0.76	26057

Limitations and Future Ideas

- General issues
  - Not filtering according to UsefulCounts
  - Not distinguishing a neutral category
  - All models are overfitting

- Modeling
  - Both Bag of Words and TF-IDF models lose a lot of semantic information
    - Word2Vec overcomes some issues by placing words in relation to one another, so give some idea of semantic proximity