

LIVE

BREAKING NEWS:

*Anime Recommender
from TV Show Input*

Daniel Wang presents a Capstone Project to General Assembly
DSI 123 on April 17, 2023

TABLE OF CONTENTS

01

PROBLEM STATEMENT

What was the goal here?

02

THE DATA

The data that powers the magic.
Where and how did we get it?

03

MODELING

LDA/LSI learning model to generate similarities. Also, simpler models.

04

RECOMMENDER

Demonstrating our recommender in action

05

IMPROVEMENTS

A lot of meat left on the bone.
What else could we do?

06

CONCLUSION

Thanks for your attention- let's wrap this up!



NEWSFLASH

01

PROBLEM STATEMENT

STUDY SHOW DOZENS OF PEOPLE DON'T ENJOY ANIME!
MORE ON THIS STORY AT 10PM

**ANIME RECOMMENDATIONS
FROM TV SHOWS!**

GIVE ANIME A CHANCE!

- Yes, it's true: There ARE many people out there who don't like anime.
- Okay, but IF they were willing to give anime a chance, how do we make that attempt as smooth as possible? **By recommending them an anime series similar to a TV show they already like.**



JUST YOUR AVERAGE HATER...



***Paulie/Polly Puppet* (*They/Them*)**

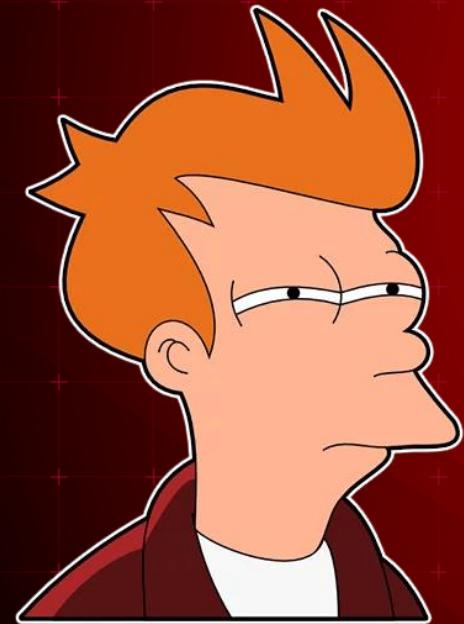
"I don't like anime. I do not like green eggs and ham.

I think anime and all other cartoons are CHILDISH. I hate the exaggerated facial expressions and over-the-top voice acting. I think anime is for LOSERS and don't like the fanbase; all those sweaty neckbeards eating Hot Pockets and drinking Mountain Dew."

IN DEPTH

ARTISTIC MERITS OF ANIME

- Storied cultural history.
- Animated nature allows for fuller range of emotional display
- Can depict stories and situations (until recently) not possible with human actors.
- Wide variety of genres within “anime” umbrella; some even depicting realistic scenarios without overly cartoonish style. (Slice-of-life)



OPERATION WEEB-IFY (A PLAN OF ATTACK)

DEFINE THE PROBLEM



ANALYZE



& CLEAN

COLLECT[^] DATA

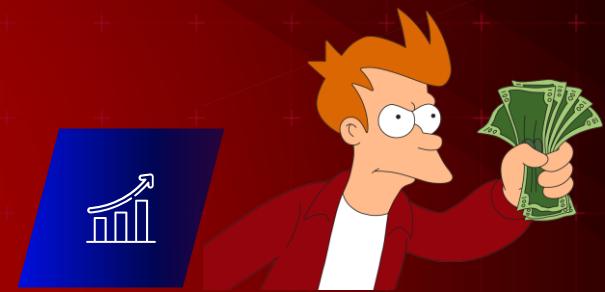
Gather the data on shows (for input & output) that we could use to make recommendations on.

**BUILD
RECOMMENDER**

Use a combination of Data Science techniques to build a recommender engine.

??? (PROFIT)

Deploy our recommender and hope people take our suggestions into consideration.





02

LIVE

THE DATA

The data that powers the magic. Where and how did we get it?



DATA SOURCES

~~myanimelist
.net~~

Good for anime, but any directly comparable info for live-action TV shows would need to come from elsewhere.

IMDb

Even with API, can't get wanted info.
Resort to webscraping.
Useful for top shows lists by genre.

Wikipedia

Publicly available API, but entries are not in standardized section formats.
Resorted to extracting whole pages.

TheMovieDB

Wish I'd just started here. This had nearly everything I needed.



FINAL DATA USED

IMDb

Name, href (URL for tv show pages), years, description, PG rating, genre tags, imdb rating, # votes, img thumbnail URL

TheMovieDB

Name, original name, original language, origin country, popularity, vote average, vote count, first air date, adult content (Y/N), poster img URL, (show) overview, tagline, genres, TV networks, keywords

Wikipedia

Returned search term, search URL, text of article

ALSO IN THE NEWS:

...ATER STILL WET. PIGS STILL CAN'T FLY. COME ON SCIEN...

For more info:

[SLIDESGO](#) | [SLIDESGO SCHOOL](#) | [FAQs](#)



HOW DO WE KNOW IT'S ANIME?



CRITERIA

```
a = df['tmdb_keywords'].str.contains("anime") #191  
b = df['origin_country'].str.contains("JP") #184  
c = df['imdb_genre_tags'].str.contains("Animation") #481  
d = df['wiki_text'].str.contains("anime") #261
```

MY FINAL CRITERIA...

```
df.loc[a&c, 'is_anime'] = 1  
(having tmdb_keyword of 'anime' & imdb_tag of 'Animation')
```



03



LIVE

MODELING

LDA/LSI learning model to generate similarities.
Also, simpler models.



DATA SCIENCE TECHNIQUES/TERMS

Concepts Used

Topic modeling	Finding natural groups/clusters of articles/documents/text
Unsupervised Learning/Classification	When you don't give the computer any 'labels' to train on
Latent Dirichlet Allocation (LDA)	Probabilistic model that infers a hidden topic structure
Latent Semantic Indexing (LSI)	Model based on SVD (Singular Value decomposition), principal component analysis
Saliency	Tells which WORDS are most impactful for identifying topics of the documents
Perplexity	Measures how good the MODEL predicts words in a document/set

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LDA vs. LSI

(Based on different mathematical models)

Latent Dirichlet Allocation (LDA)

- Based on a probabilistic generative model
- Goal: discover main topics and distribution of words within those topics.
- Supposedly better for “messy”/noisy data
- Less prone to overfitting
- More interpretable topics(?)

Latent Semantic Indexing (LSI)

- Based on SVD (Singular Value decomposition), principal component analysis
- Can directly output similarity
- More computationally efficient (FAST!)

MODEL VARIATIONS

FORCED # TOPICS

And multiple re-runs

SUBSETS OF DATA

With/without certain data columns (e.g., ALL of Wikipedia)

DIFFERENT MODEL TYPES

LDA, LSI, cosine similarity on keyword only

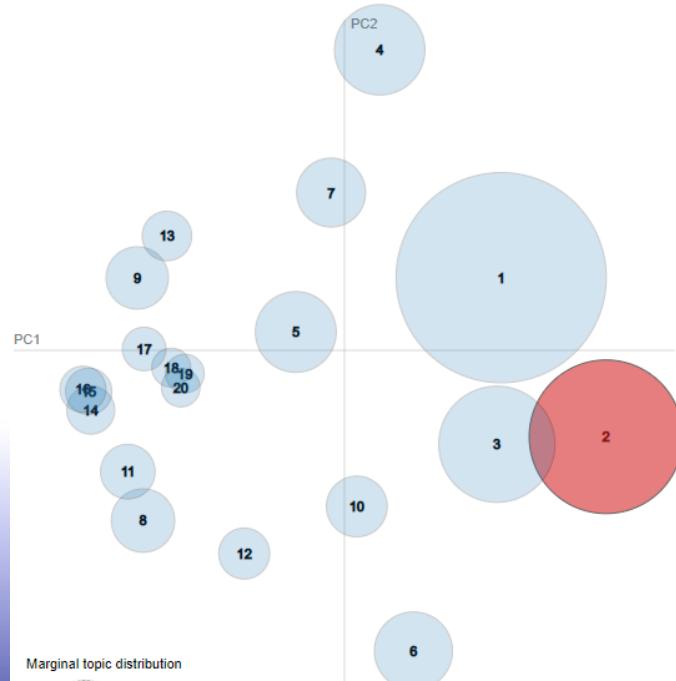


**A PICTURE IS WORTH A
THOUSAND WORDS**

pyLDAvis

Selected Topic:

Intertopic Distance Map (via multidimensional scaling)



Marginal topic distribution

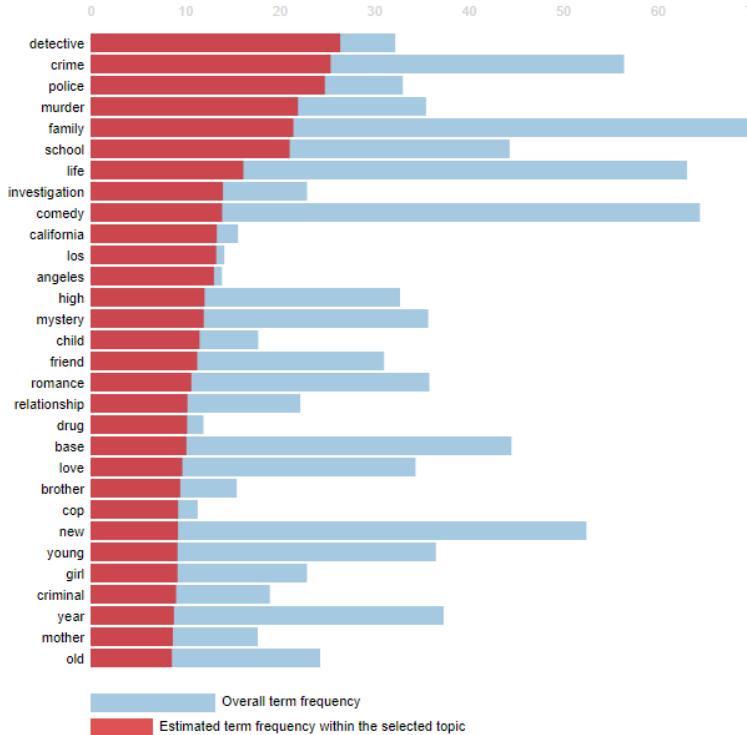


Slide to adjust relevance metric:⁽²⁾

$\lambda = 1$

0.0 0.2 0.4 0.6 0.8 1.0

Top-30 Most Relevant Terms for Topic 2 (16.9% of tokens)



Overall term frequency

Estimated term frequency within the selected topic

1. saliency(term w) = frequency(w) * [sum_t p(t | w) * log(p(t | w)/p(t))] for topics t; see Chuang et. al (2012)

2. relevance(term w | topic t) = $\lambda * p(w | t) + (1 - \lambda) * p(w | t)/p(w)$; see Sievert & Shirley (2014)

RESULTS EXPLORATION



LDA results in Jupyter
Notebook via pyLDAvis

(*Alt-Tab here*)

04

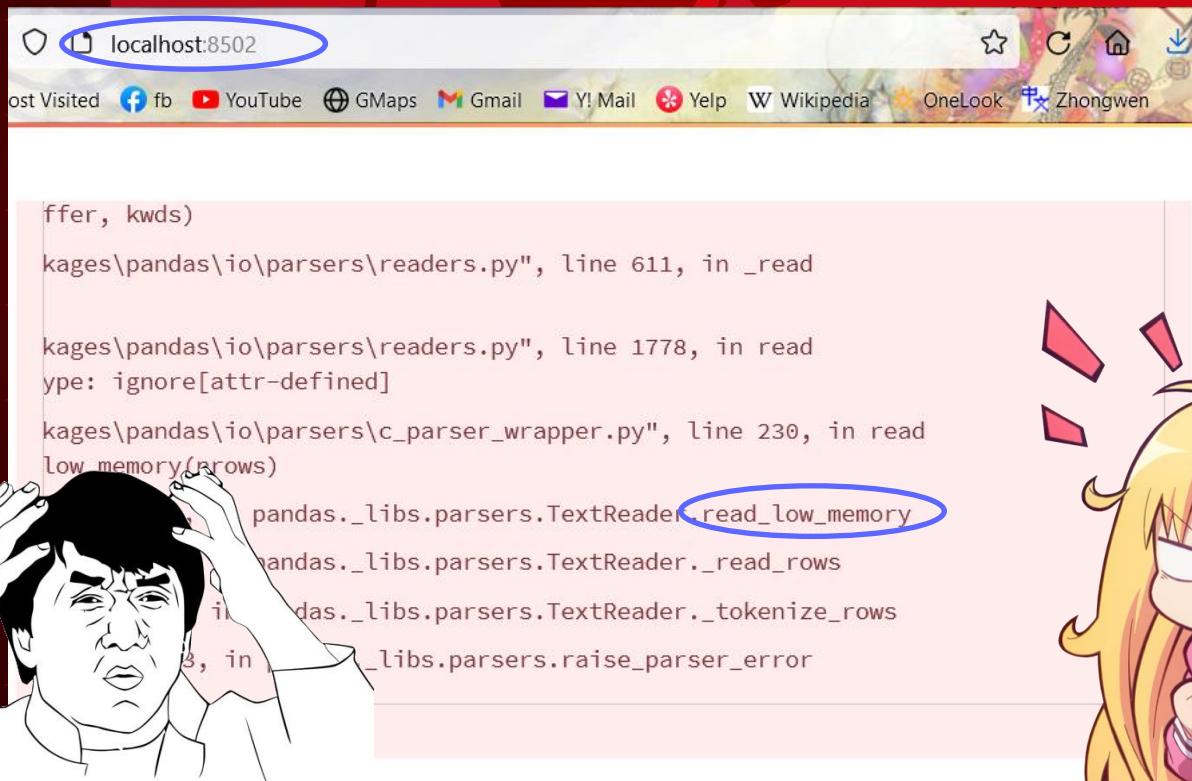
LIVE

RECOMMENDER

Demonstrating our recommender in action*



EPIC FAIL. *RAGE QUIT*



Streamlet.io

You had ONE job...

You failed me!



JUPYTER NOTEBOOK?!?

(yes, really)



+ In lieu of a demonstration of a functional Streamlit app,

...a demonstration inside Jupyter notebook!

(*Alt-Tab here*)



How it SHOULD have looked...

YOU INPUT:

GAME OF THREES

ANIME OUTPUT ONLY?



NUMBER OF OUTPUT ENTRIES:
(DEFAULT: 5)

3

NO EXACT MATCHES FOR INPUT “ GAME OF THREES ”.

1 RESULTS STARTING THE SAME FOUND. DID YOU MEAN:

NAME	YEARS	Href
“GAME OF THRONES”	(2011-2019)	/TITLE/TT0944947/”

OUR TOP RECOMMENDED MATCHES...



6. **Attack on Titan** (2013–2023)

TV-MA | 24 min | Animation, Action, Adventure

★ 9.0 [Rate this](#)

After his hometown is destroyed and his mother is killed, young Eren Jaeger vows to cleanse the earth of the giant humanoid Titans that have brought humanity to the brink of extinction.

Stars: [Josh Grelle](#), [Bryce Papenbrook](#), [Yūki Kaji](#), [Yui Ishikawa](#)

Votes: 404,758



8. **Hunter x Hunter** (2011–2014)

TV-14 | 24 min | Animation, Action, Adventure

★ 9.0 [Rate this](#)

Gon Freecss aspires to become a Hunter, an exceptional being capable of greatness. With his friends and his potential, he seeks out his father, who left him when he was younger.



9. **Death Note** (2006–2007)

TV-14 | 23 min | Animation, Crime, Drama

★ 9.0 [Rate this](#)

An intelligent high school student goes on a secret crusade to eliminate criminals from the world after discovering a notebook capable of killing anyone whose name is written into it.

Stars: [Mamoru Miyano](#), [Brad Swaile](#), [Vincent Tong](#), [Ryō Naitō](#)

Votes: 339,062



05

LIVE

AWESOME NEWS*

(*NOT)

...ROOM FOR IMPROVEMENT

A lot of meat left on the bone.

What else could we do?



AREAS FOR IMPROVEMENT

1. TUNE WHICH INPUTS

Final models all exclude Wikipedia data. (Too much unhelpful garbage data.)

2. MORE OUTPUT FILTERS

I personally disagree with some of the recommendations.

Try: no shows under ___ score; no shows under ___ reviews

3. FUNCTIONING STREAMLIT

Without a public-facing tool, available to the masses – what was it all for? =(

4. JUST USE SQL QUERY!

@brohrer@recsys.social
 @_brohrer_

ML strategy tip

When you have a problem, build two solutions - a deep Bayesian transformer running on multicloud Kubernetes and a SQL query built on a stack of egregiously oversimplifying assumptions. Put one on your resume, the other in production. Everyone goes home happy.

6:45 AM · Aug 12, 2021 · Twitter for iPhone





“Fail Fast. Fail Forward”

YOLO. For Science.



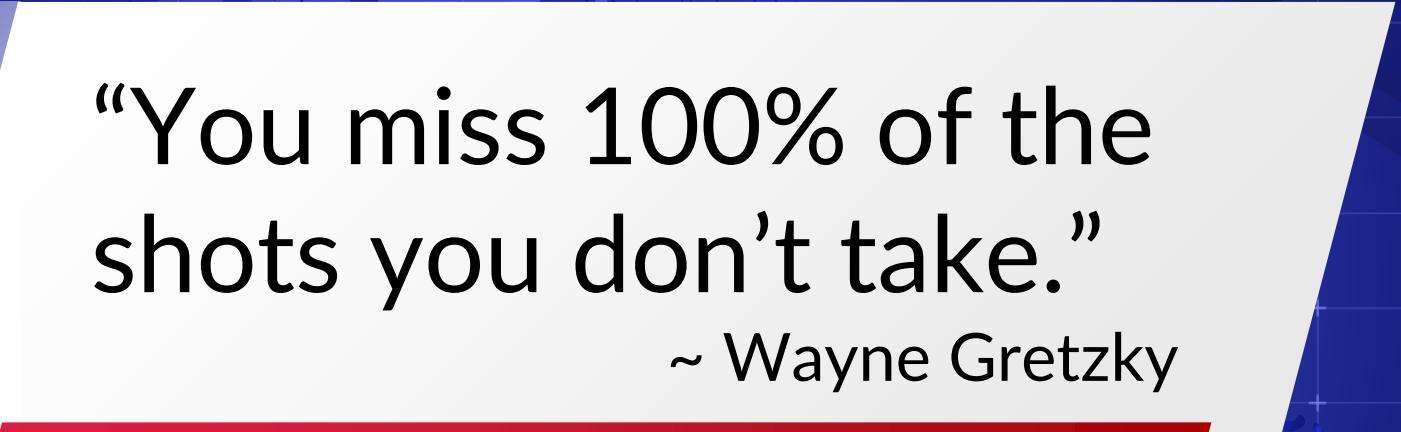


06

CONCLUSION

Thanks for your attention- let's wrap this up!





“You miss 100% of the shots you don’t take.”

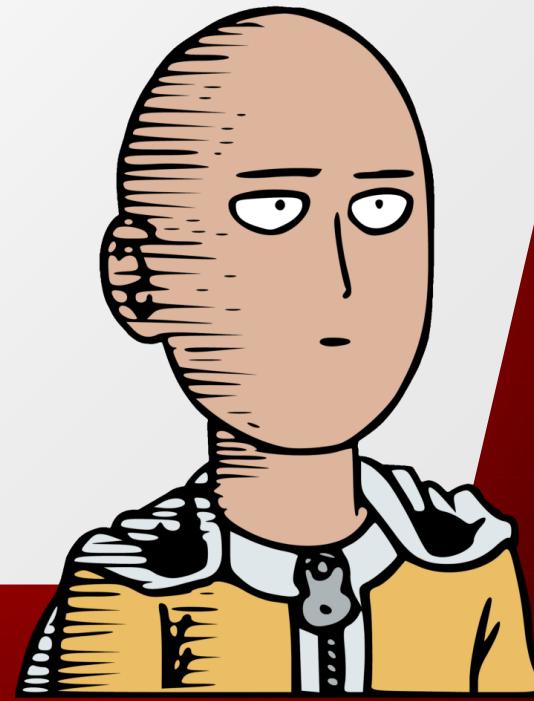
~ Wayne Gretzky



—MICHAEL SCOTT



So, you're going to try anime, right?



OK

RESOURCES

Useful webpages I referenced:

Data Sources

- IMDb - www.imdb.com
- Wikipedia - en.wikipedia.org
- TheMovieDB - www.themoviedb.org

Data Science Technique References

- General Assembly DSI Lesson [705-lesson-recommender-systems](#)
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- (Avinash Navlani) <https://machinelearninggeek.com/latent-semantic-indexing-using-scikit-learn/>
- <https://stackoverflow.com/questions/21285380/find-column-whose-name-contains-a-specific-string>
- <https://www.statology.org/pandas-check-if-column-contains-string/>
- (Raiyan Quarium) <https://medium.com/@raiyanquarium/how-to-web-scrape-using-beautiful-soup-in-python-without-running-into-http-error-403-554875e5abed>



A SPECIAL THANKS TO...



Instructors

Tim, Katie, Loren, Rowan... and Sim too!

...AND VIEWERS LIKE YOU!

Classmates

Class of 2023! WOOoooOOO!!!

Best BFF forevar!!!

Stay cool. Never change.

H.A.G.S.! K.I.T.!



LIVE

THANKS

Do you have any questions?

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https://github.com/wangdj3/DSI_Capstone/



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