DTSA_Final_Project

December 9, 2025

1 Final Project

1.0.1 DTSA 5510: Unsupervised Algorithms in Machine Learning

1.0.2 December 9 2025

Data Source: https://www.kaggle.com/datasets/jrobischon/wikipedia-movie-plots/data

1.0.3 Problem Statement

Movie Genres fail to capture accurate themes for 2 reasons:

1. They're too broad.

2. Genres are missing or unknown.

Using Unsupervised Machine Learning it's possible to analyze movie plots and discover these Sub-Genres. BERTopic will be used to to discover these granular genres without manual classication.

1.1 Load Dependencies

```
[1]: %%capture
     !pip install bertopic
```

```
[2]: %%capture
     !python -m spacy download en_core_web_sm
```

```
[3]: import torch
     print(f"PyTorch Version: {torch.__version__}")
     print(f"CUDA Version in Torch: {torch.version.cuda}")
```

```
PyTorch Version: 2.9.0+cu126
CUDA Version in Torch: 12.6
```

```
[4]: import torch

     cuda_available = torch.cuda.is_available()
     print(f"CUDA Available: {cuda_available}")

     if cuda_available:
```

```
        print(f"Number of GPUs available: {torch.cuda.device_count()}")
        print(f"GPU Name: {torch.cuda.get_device_name(0)}")
```

```
CUDA Available: True
Number of GPUs available: 1
GPU Name: NVIDIA A100-SXM4-40GB
```

[5]:
```python
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import spacy
import re
from sklearn.feature_extraction.text import CountVectorizer
import matplotlib.pyplot as plt
import seaborn as sns
from bertopic import BERTopic
```

```
/usr/local/lib/python3.12/dist-packages/hdbscan/robust_single_linkage_.py:175:
SyntaxWarning: invalid escape sequence '\{'
  $max \{ core_k(a), core_k(b), 1/\alpha d(a,b) \}$.
```

2 Exploratory Data Analysis

There are 34,886 rows and 8 columns in this dataset.

Dataset Column Descriptions:

Release Year - Year in which the movie was released

Title - Movie title

Origin/Ethnicity - Origin of movie (i.e. American, Bollywood, Tamil, etc.)

Director - Director(s)

Genre - Movie Genre(s)

Wiki Page - URL of the Wikipedia page from which the plot description was scraped

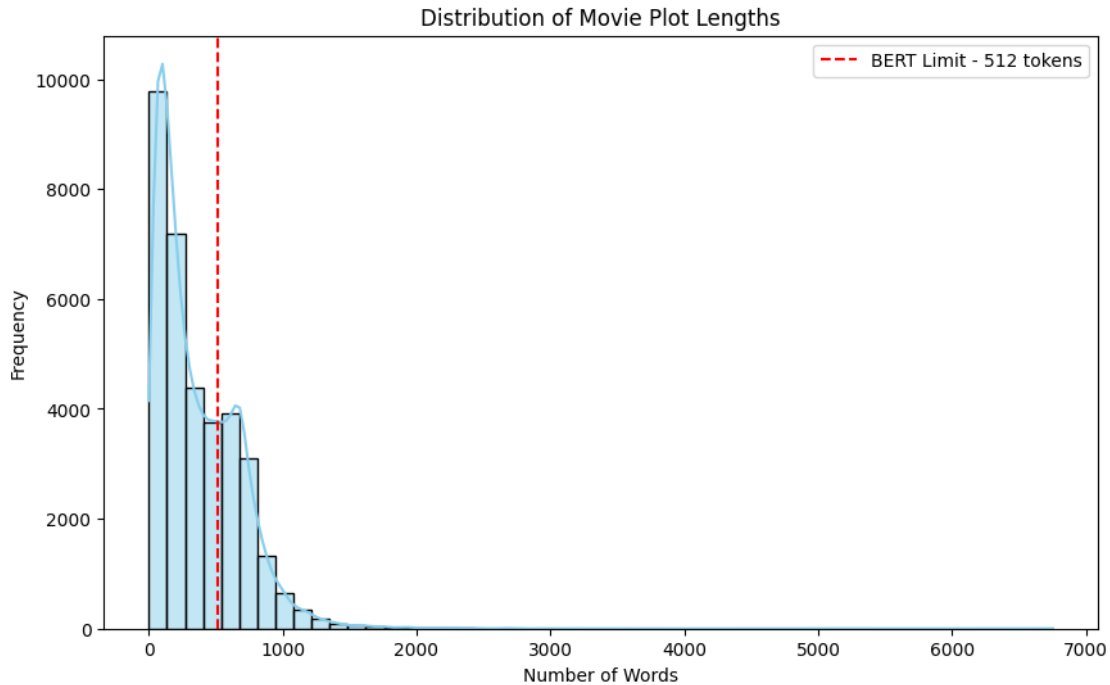**Plot** - Long form description of movie plot (WARNING: May contain spoilers!!!)

[6]:
```python
df = pd.read_csv('wiki_movie_plots_deduped.csv')
print("There are {} rows and {} columns in this dataset.".format(*df.shape))

# Calculate Word Counts
df['word_count'] = df['Plot'].apply(lambda x: len(str(x).split()))

plt.figure(figsize=(10, 6))
sns.histplot(df['word_count'], bins=50, kde=True, color='skyblue')
plt.title('Distribution of Movie Plot Lengths')
plt.xlabel('Number of Words')
```

```
plt.ylabel('Frequency')
plt.axvline(x=512, color='r', linestyle='--', label='BERT Limit - 512 tokens')
plt.legend()
plt.show()
```

There are 34886 rows and 8 columns in this dataset.

Distribution of Movie Plot Lengths

Most of the movie plots fall within the **512 token limit of BERT.**

Anything longer will be truncated.

2.0.1 Plots with fewer than 20 words:

```
[7]: short_plots = df[df['word_count'] <= 20]

print(f"Number of short plots: {len(short_plots)}")
print("\n Examples:")
for i, plot in enumerate(short_plots['Plot'].head(10)):
    print(f"{i+1}. {plot}")
```

Number of short plots: 683

 Examples:
1. The story as told by Moving Picture World reads:

2. Described as "a liberal adaptation of Mrs. Shelley's famous story", the plot description in the Edison Kinetogram was:[3]
3. The following plot synopsis was published in conjunction with a 1915 showing of the film at Carnegie Hall:
4. Considered a coward by his fiancée and comrades in arms, a British army officer has to redeem himself.
5. A farm youth goes to college, pursues the pretty co-eds and joins a fraternity.
6. Luke (Harold Lloyd) works in a shoe store, but has difficulty focusing on work when a pretty girl is near.
7. Lonesome Luke (Harold Lloyd) tries to sell books to a businessman and his wife.
8. The film is about a court case and embezzlement.
9. Bebe plays a pretty young thing with several suitors, including Harold, competing to win her affections.
10. The plot of Experience was summarized in the August 1921 issue of Photoplay magazine.

Plots that are fewer than 20 words are not very helpful and will be removed.

2.0.2 Top Genres in Dataset

```python
[8]:  # Load spacy model
      nlp = spacy.load("en_core_web_sm", disable=['parser', 'ner'])

      df_clean = df[df['word_count'] > 20].copy()
      print(f"Rows after dropping short plots: {len(df_clean)}")

      # Common phrases to remove
      custom_blocklist = [
          "forms the rest of the story",
          "forms the crux of the story",
          "the film tells the story",
          "the story as told by",
          "the plot description",
          "the film ends with",
          "post-credits scene",
          "post credits scene",
          "plot synopsis"
      ]

      def clean_text(text):
          text = str(text).lower()
          text = re.sub(r'\[.*?\]', '', text)

          for phrase in custom_blocklist:
              text = text.replace(phrase, "")
```

```
    text = re.sub(r'\s+', ' ', text).strip()

    return text

df_clean['clean_plot'] = df_clean['Plot'].apply(clean_text)

# Check if blocklist terms have been removed
check_phrase = "forms the rest of the story"
print(f"Does the phrase '{check_phrase}' still exist? {df_clean['clean_plot'].
    ↪str.contains(check_phrase).any()}")
```

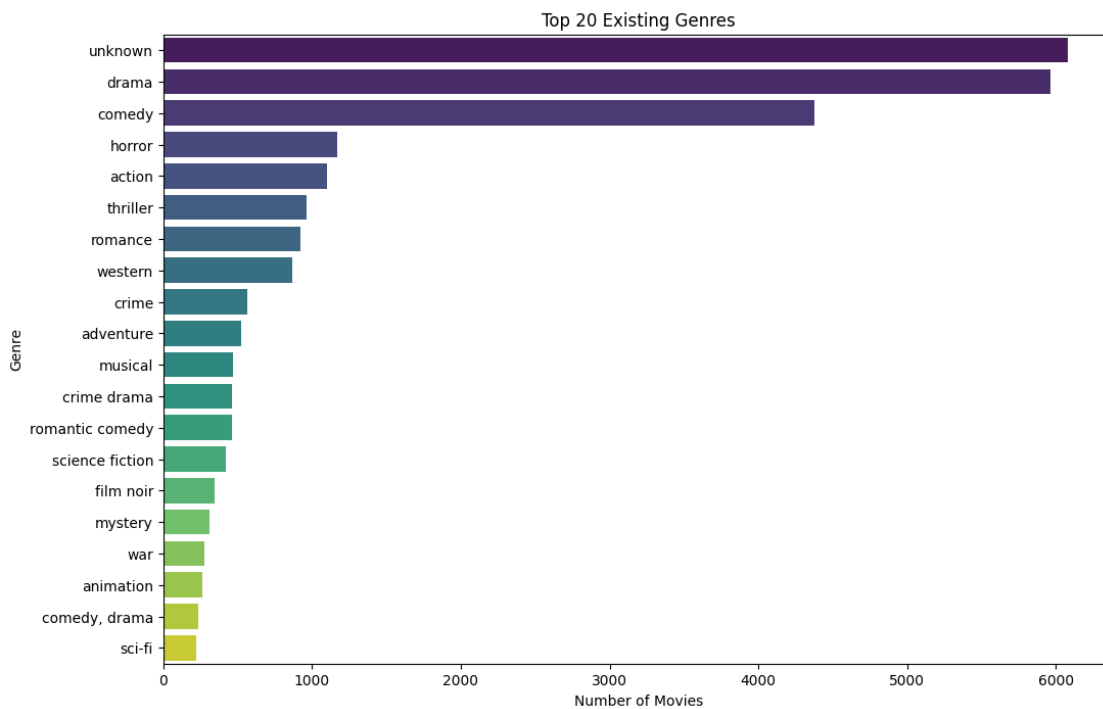Rows after dropping short plots: 34203
Does the phrase 'forms the rest of the story' still exist? False

[9]:
```
top_genres = df['Genre'].value_counts().head(20)

plt.figure(figsize=(12, 8))
sns.barplot(x=top_genres.values, y=top_genres.index, palette='viridis')
plt.title('Top 20 Existing Genres')
plt.xlabel('Number of Movies')
plt.show()
```


It looks like 'Unknown' is the largest Genre in this dataset. This is unhelpful and why our unsupervised approach on the actual plots will be so useful.

5

I'll remove stop words and see what the most common bigrams and trigrams are.

Bigrams are consecutive 2-word tokens.

Trigrams are consecutive 3-word tokens.

It'll give me an idea of what kind of multi-word phrases exist in the dataset.

```
[10]:  def plot_top_ngrams(corpus, n=2, title="Top Bigrams"):
           # create vectorizer
           vec = CountVectorizer(ngram_range=(n, n), stop_words='english').fit(corpus)

           # Count words
           bag_of_words = vec.transform(corpus)
           sum_words = bag_of_words.sum(axis=0)

           # Sort words
           words_freq = [(word, sum_words[0, idx]) for word, idx in vec.vocabulary_.
        ↪items()]
           words_freq = sorted(words_freq, key=lambda x: x[1], reverse=True)[:15]

           x, y = map(list, zip(*words_freq))
           plt.figure(figsize=(10, 6))
           sns.barplot(x=y, y=x, palette='viridis')
           plt.title(title)
           plt.xlabel('Frequency')
           plt.show()

       # Bigrams
       plot_top_ngrams(df_clean['clean_plot'], n=2, title="Top 15 Bigrams")

       # Trigrams
       plot_top_ngrams(df_clean['clean_plot'], n=3, title="Top 15 Trigrams")
```
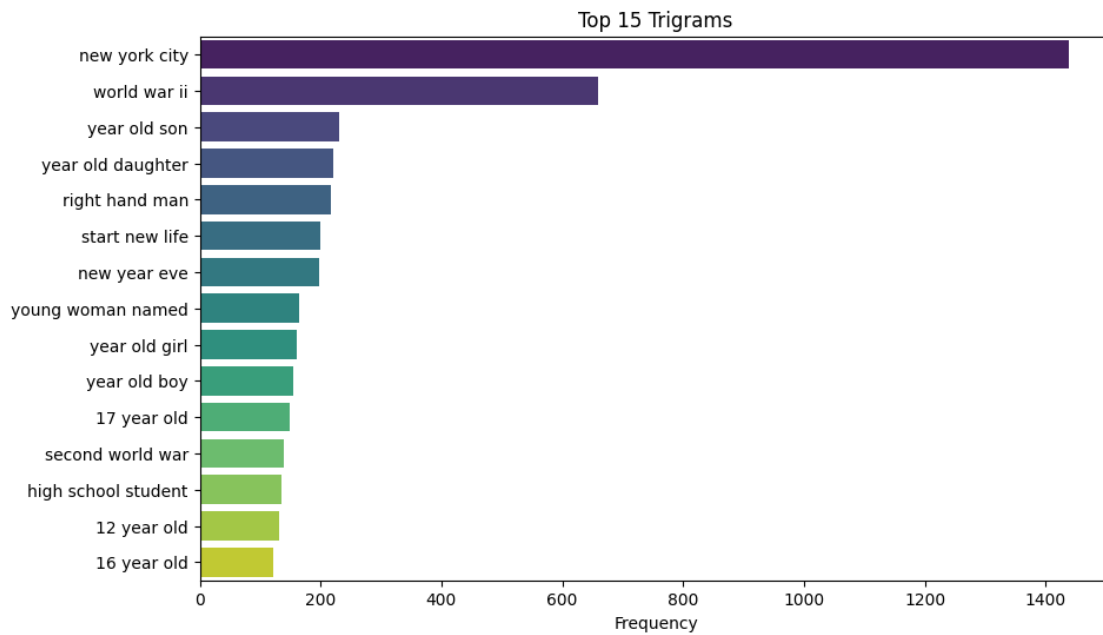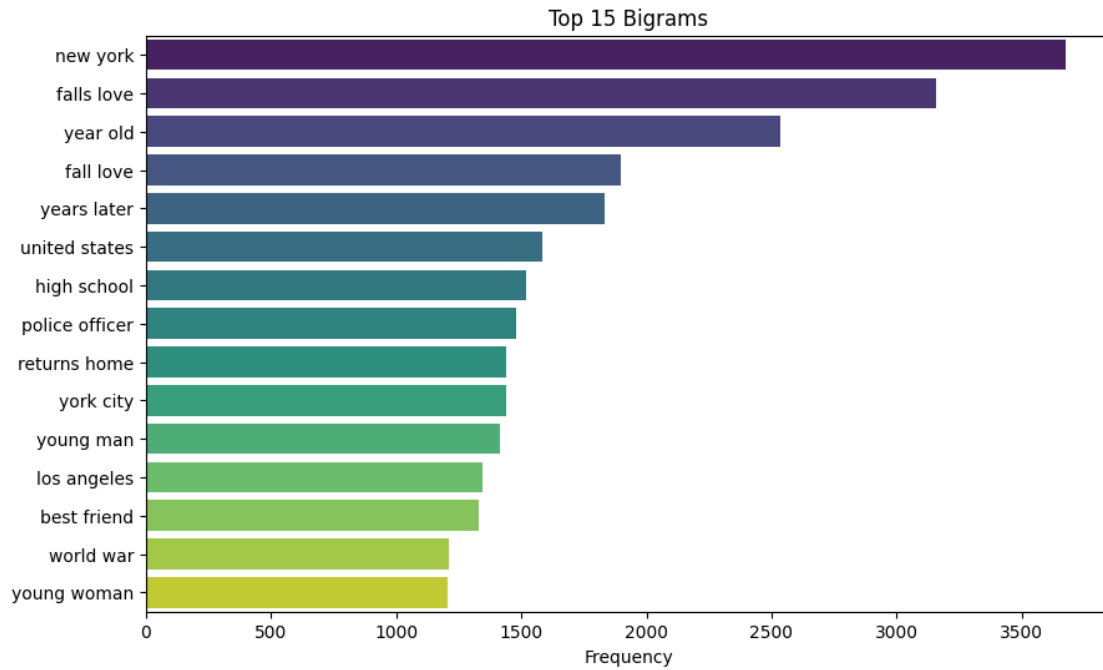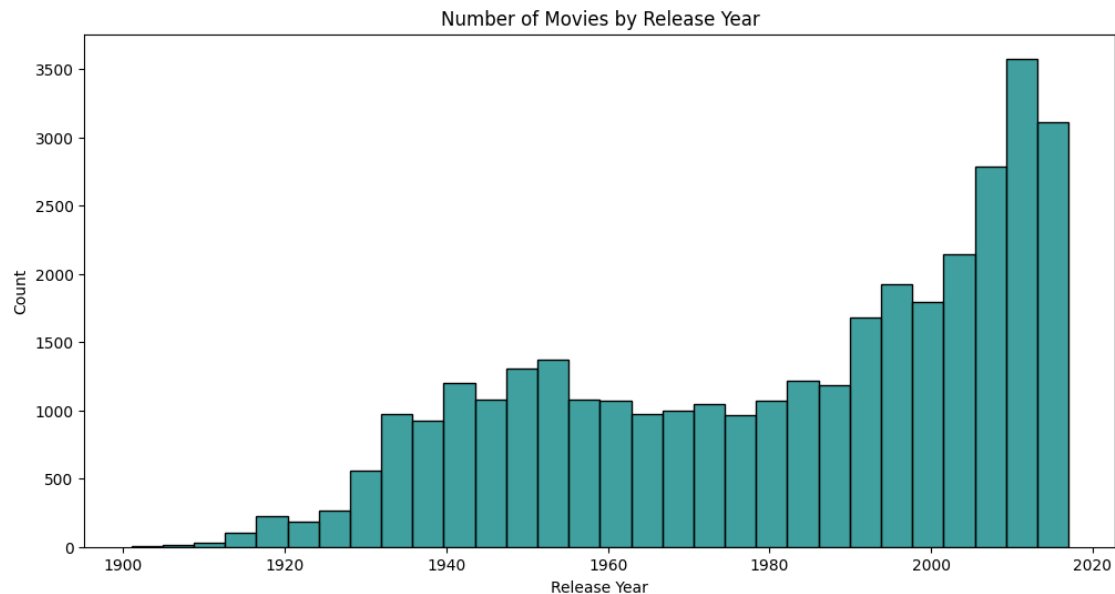
Top 15 Bigrams

Bigram	Frequency
new york	~3650
falls love	~3150
year old	~2550
fall love	~1850
years later	~1750
united states	~1550
high school	~1500
police officer	~1450
returns home	~1400
york city	~1400
young man	~1380
los angeles	~1300
best friend	~1280
world war	~1180
young woman	~1180

Top 15 Trigrams

Trigram	Frequency
new york city	~1450
world war ii	~670
year old son	~250
year old daughter	~230
right hand man	~230
start new life	~210
new year eve	~210
young woman named	~180
year old girl	~170
year old boy	~160
17 year old	~160
second world war	~150
high school student	~150
12 year old	~150
16 year old	~140

2.1 Time Series Overview

```
[11]: plt.figure(figsize=(12, 6))
      sns.histplot(df['Release Year'], bins=30, color='teal')
      plt.title('Number of Movies by Release Year')
      plt.show()
```


3 Model Building

At a high level the pipeline will do the following:

Convert text into vectors using Vectorization.

Dimensionality reduction using UMAP to project high dimensional embeddings into lower dimensi-noal space.

Embeddings are clustered using HDBSCAN.

```
[12]: # Create Vectorizer
      vectorizer_model = CountVectorizer(stop_words="english", ngram_range=(1, 3))

      # Initialize BertTopic
      topic_model = BERTopic(
          vectorizer_model=vectorizer_model,
          language="english",
          calculate_probabilities=False,
          verbose=True,
          min_topic_size=15
      )
```

```python
# Train Model
topics, probs = topic_model.fit_transform(df_clean['clean_plot'].tolist())

freq = topic_model.get_topic_info()
print(f"Number of topics found: {len(freq)}")
print(freq.head(10))
```

2025-12-09 03:14:57,723 - BERTopic - Embedding - Transforming documents to embeddings.

modules.json: 0%| | 0.00/349 [00:00<?, ?B/s]

config_sentence_transformers.json: 0%| | 0.00/116 [00:00<?, ?B/s]

README.md: 0.00B [00:00, ?B/s]

sentence_bert_config.json: 0%| | 0.00/53.0 [00:00<?, ?B/s]

config.json: 0%| | 0.00/612 [00:00<?, ?B/s]

model.safetensors: 0%| | 0.00/90.9M [00:00<?, ?B/s]

tokenizer_config.json: 0%| | 0.00/350 [00:00<?, ?B/s]

vocab.txt: 0.00B [00:00, ?B/s]

tokenizer.json: 0.00B [00:00, ?B/s]

special_tokens_map.json: 0%| | 0.00/112 [00:00<?, ?B/s]

config.json: 0%| | 0.00/190 [00:00<?, ?B/s]

Batches: 0%| | 0/1069 [00:00<?, ?it/s]

2025-12-09 03:25:04,641 - BERTopic - Embedding - Completed
2025-12-09 03:25:04,642 - BERTopic - Dimensionality - Fitting the dimensionality reduction algorithm
2025-12-09 03:25:35,698 - BERTopic - Dimensionality - Completed
2025-12-09 03:25:35,699 - BERTopic - Cluster - Start clustering the reduced embeddings
2025-12-09 03:25:39,063 - BERTopic - Cluster - Completed
2025-12-09 03:25:39,072 - BERTopic - Representation - Fine-tuning topics using representation models.
2025-12-09 03:27:06,783 - BERTopic - Representation - Completed

Number of topics found: 127
   Topic Count   Name \
0   -1 13693   -1_tells_new_home_house
1   0   9075   0_love_father_family_gets
2   1   1125   1_hong_kong_hong kong_wong
3   2   913   2_town_horse_men_ranch
4   3   849   3_police_murder_killed_case
5   4   508   4_film_story_young_love

```
6        5      449          5_kim_korean_kang_korea
7        6      355      6_ship_captain_crew_island
8        7      306    7_dr_jekyll_hospital_michael
9        8      264        8_ichi_samurai_yakuza_clan

                                      Representation  \
0   [tells, new, home, house, later, finds, man, f…
1   [love, father, family, gets, son, comes, villa…
2   [hong, kong, hong kong, wong, li, chinese, wan…
3   [town, horse, men, ranch, sheriff, cattle, gen…
4   [police, murder, killed, case, car, detective,…
5   [film, story, young, love, man, family, woman,…
6   [kim, korean, kang, korea, lee, park, seoul, m…
7   [ship, captain, crew, island, navy, submarine,…
8   [dr, jekyll, hospital, michael, doctor, hyde, …
9   [ichi, samurai, yakuza, clan, itt, sword, ninj…

                                   Representative_Docs
0   [a young man named robert ross is introduced a…
1   [sudhi and anu are siblings, studying in a boa…
2   [in 1959, ip man is settling into his low-prof…
3   [because of his drunkenness and questionable u…
4   [mobster carmine ricca (richard devon) drives …
5   [the story is about the coming of age of a 14-…
6   [the opening scene shows a group of illegal im…
7   [this film's story occurs in 1750, set roughly…
8   [henry jekyll (john barrymore) is a doctor of …
9   [ichi is being taken to doyoma, all expenses p…
```

4   Visualizations

This BERTopic method shows all topics genres as bubbles.

Big bubbles = Popular topics.

Bubbles close together = Similar themes.

```python
[13]: # Intertopic Distance Map
      fig1 = topic_model.visualize_topics()
      fig1.show()

      # Hierarchical Clustering
      fig2 = topic_model.visualize_hierarchy(top_n_topics=30)
      fig2.show()

      # Topic Bar Chart
      # Top keywords for specific topics
      fig3 = topic_model.visualize_barchart(top_n_topics=20)
```

```
fig3.show()
```

4.0.1 Topics Over Time

```
[14]: # Topics Over Time
topics_over_time = topic_model.topics_over_time(
    df_clean['clean_plot'].tolist(),
    df_clean['Release Year'].tolist(),
    nr_bins=20,
    global_tuning=False,
    evolution_tuning=False
)
```

20it [06:40, 20.00s/it]

```
[15]: # Topics Over Time
fig_heatmap = topic_model.visualize_topics_over_time(
    topics_over_time,
    top_n_topics=20,
    normalize_frequency=True,
    custom_labels=True
)
fig_heatmap.show()
```

```
[16]: topic_info = topic_model.get_document_info(df_clean['clean_plot'])

# Assign Topic Names back to original dataframe
df_clean['Predicted_Topic'] = topic_info['Name'].values

# Filter for 'unknown' genres using the original dataframe
unknown_movies = df_clean[df_clean['Genre'] == 'unknown']

print(f"Solving the 'Unknown' Genre Problem (Sample of {len(unknown_movies)}␣
 ↪movies)")
for index, row in unknown_movies.sample(5).iterrows():
    print(f"\nMovie: {row['Title']} ({row['Release Year']})")
    print(f"Original Genre: {row['Genre']}")
    print(f"New Unsupervised Label: {row['Predicted_Topic']}")
```

Solving the 'Unknown' Genre Problem (Sample of 5933 movies)

Movie: Zatoichi's Pilgrimage (1966)
Original Genre: unknown
New Unsupervised Label: 8_ichi_samurai_yakuza_clan

Movie: Filth (2013)
Original Genre: unknown

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```
New Unsupervised Label: 76_batman_superman_lois_joker

Movie: Upendra (1999)
Original Genre: unknown
New Unsupervised Label: 0_love_father_family_gets

Movie: Thirumal Perumai (1968)
Original Genre: unknown
New Unsupervised Label: 0_love_father_family_gets

Movie: God Help the Girl (2014)
Original Genre: unknown
New Unsupervised Label: -1_tells_new_home_house
```

5   Conclusion

The goal was to handle unlabelled data using a unsupervised approach. In the original dataset The single largest 'genre' category was unknown, making it tough to analyze.

My unsupervised pipeline, using BERTopic, was able to correctly classify these previously unknown datapoints in an automated way.

As demonstrated in the cell above, looking at these examples where the movie genre was originally classified as unknown, we now have accurate granular labels. The model was able to sucessfully generate these themes using the movies plot.

[17]:
```
!apt-get install -y texlive-xetex texlive-fonts-recommended texlive-latex-extra
```

```
Reading package lists… Done
Building dependency tree… Done
Reading state information… Done
The following additional packages will be installed:
  dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
  fonts-texgyre fonts-urw-base35 libapache-pom-java libcommons-logging-java
  libcommons-parent-java libfontbox-java libgs9 libgs9-common libidn12
  libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java libptexenc1 libruby3.0
  libsynctex2 libteckit0 libtexlua53 libtexluajit2 libwoff1 libzzip-0-13
  lmodern poppler-data preview-latex-style rake ruby ruby-net-telnet
  ruby-rubygems ruby-webrick ruby-xmlrpc ruby3.0 rubygems-integration t1utils
  teckit tex-common tex-gyre texlive-base texlive-binaries texlive-latex-base
  texlive-latex-recommended texlive-pictures texlive-plain-generic tipa
  xfonts-encodings xfonts-utils
Suggested packages:
  fonts-noto fonts-freefont-otf | fonts-freefont-ttf libavalon-framework-java
  libcommons-logging-java-doc libexcalibur-logkit-java liblog4j1.2-java
  poppler-utils ghostscript fonts-japanese-mincho | fonts-ipafont-mincho
  fonts-japanese-gothic | fonts-ipafont-gothic fonts-arphic-ukai
  fonts-arphic-uming fonts-nanum ri ruby-dev bundler debhelper gv
  | postscript-viewer perl-tk xpdf | pdf-viewer xzdec
```

```
  texlive-fonts-recommended-doc texlive-latex-base-doc python3-pygments
  icc-profiles libfile-which-perl libspreadsheet-parseexcel-perl
  texlive-latex-extra-doc texlive-latex-recommended-doc texlive-luatex
  texlive-pstricks dot2tex prerex texlive-pictures-doc vprerex
  default-jre-headless tipa-doc
The following NEW packages will be installed:
  dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono
  fonts-texgyre fonts-urw-base35 libapache-pom-java libcommons-logging-java
  libcommons-parent-java libfontbox-java libgs9 libgs9-common libidn12
  libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java libptexenc1 libruby3.0
  libsynctex2 libteckit0 libtexlua53 libtexluajit2 libwoff1 libzzip-0-13
  lmodern poppler-data preview-latex-style rake ruby ruby-net-telnet
  ruby-rubygems ruby-webrick ruby-xmlrpc ruby3.0 rubygems-integration t1utils
  teckit tex-common tex-gyre texlive-base texlive-binaries
  texlive-fonts-recommended texlive-latex-base texlive-latex-extra
  texlive-latex-recommended texlive-pictures texlive-plain-generic
  texlive-xetex tipa xfonts-encodings xfonts-utils
0 upgraded, 53 newly installed, 0 to remove and 41 not upgraded.
Need to get 182 MB of archives.
After this operation, 571 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-droid-fallback all
1:6.0.1r16-1.1build1 [1,805 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-lato all 2.0-2.1
[2,696 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy/main amd64 poppler-data all
0.4.11-1 [2,171 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tex-common all 6.17
[33.7 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-urw-base35 all
20200910-1 [6,367 kB]
Get:6 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libgs9-common
all 9.55.0~dfsg1-0ubuntu5.13 [753 kB]
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libidn12 amd64
1.38-4ubuntu1 [60.0 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy/main amd64 libijs-0.35 amd64
0.35-15build2 [16.5 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/main amd64 libjbig2dec0 amd64
0.19-3build2 [64.7 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libgs9 amd64
9.55.0~dfsg1-0ubuntu5.13 [5,032 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libkpathsea6
amd64 2021.20210626.59705-1ubuntu0.2 [60.4 kB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/main amd64 libwoff1 amd64
1.0.2-1build4 [45.2 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy/universe amd64 dvisvgm amd64
2.13.1-1 [1,221 kB]
Get:14 http://archive.ubuntu.com/ubuntu jammy/universe amd64 fonts-lmodern all
2.004.5-6.1 [4,532 kB]
```

13

```
Get:15 http://archive.ubuntu.com/ubuntu jammy/main amd64 fonts-noto-mono all
20201225-1build1 [397 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy/universe amd64 fonts-texgyre all
20180621-3.1 [10.2 MB]
Get:17 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libapache-pom-java
all 18-1 [4,720 B]
Get:18 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcommons-parent-
java all 43-1 [10.8 kB]
Get:19 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libcommons-logging-
java all 1.2-2 [60.3 kB]
Get:20 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libptexenc1
amd64 2021.20210626.59705-1ubuntu0.2 [39.1 kB]
Get:21 http://archive.ubuntu.com/ubuntu jammy/main amd64 rubygems-integration
all 1.18 [5,336 B]
Get:22 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby3.0 amd64
3.0.2-7ubuntu2.11 [50.1 kB]
Get:23 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby-rubygems
all 3.3.5-2ubuntu1.2 [228 kB]
Get:24 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby amd64 1:3.0~exp1
[5,100 B]
Get:25 http://archive.ubuntu.com/ubuntu jammy/main amd64 rake all 13.0.6-2 [61.7
kB]
Get:26 http://archive.ubuntu.com/ubuntu jammy/main amd64 ruby-net-telnet all
0.1.1-2 [12.6 kB]
Get:27 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby-webrick
all 1.7.0-3ubuntu0.2 [52.5 kB]
Get:28 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 ruby-xmlrpc all
0.3.2-1ubuntu0.1 [24.9 kB]
Get:29 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libruby3.0
amd64 3.0.2-7ubuntu2.11 [5,114 kB]
Get:30 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libsynctex2
amd64 2021.20210626.59705-1ubuntu0.2 [55.6 kB]
Get:31 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libteckit0 amd64
2.5.11+ds1-1 [421 kB]
Get:32 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libtexlua53
amd64 2021.20210626.59705-1ubuntu0.2 [120 kB]
Get:33 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 libtexluajit2
amd64 2021.20210626.59705-1ubuntu0.2 [267 kB]
Get:34 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libzzip-0-13 amd64
0.13.72+dfsg.1-1.1 [27.0 kB]
Get:35 http://archive.ubuntu.com/ubuntu jammy/main amd64 xfonts-encodings all
1:1.0.5-0ubuntu2 [578 kB]
Get:36 http://archive.ubuntu.com/ubuntu jammy/main amd64 xfonts-utils amd64
1:7.7+6build2 [94.6 kB]
Get:37 http://archive.ubuntu.com/ubuntu jammy/universe amd64 lmodern all
2.004.5-6.1 [9,471 kB]
Get:38 http://archive.ubuntu.com/ubuntu jammy/universe amd64 preview-latex-style
all 12.2-1ubuntu1 [185 kB]
```

```
Get:39 http://archive.ubuntu.com/ubuntu jammy/main amd64 t1utils amd64
1.41-4build2 [61.3 kB]
Get:40 http://archive.ubuntu.com/ubuntu jammy/universe amd64 teckit amd64
2.5.11+ds1-1 [699 kB]
Get:41 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tex-gyre all
20180621-3.1 [6,209 kB]
Get:42 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 texlive-
binaries amd64 2021.20210626.59705-1ubuntu0.2 [9,860 kB]
Get:43 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-base all
2021.20220204-1 [21.0 MB]
Get:44 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-fonts-
recommended all 2021.20220204-1 [4,972 kB]
Get:45 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-base
all 2021.20220204-1 [1,128 kB]
Get:46 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libfontbox-java all
1:1.8.16-2 [207 kB]
Get:47 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libpdfbox-java all
1:1.8.16-2 [5,199 kB]
Get:48 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-
recommended all 2021.20220204-1 [14.4 MB]
Get:49 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-pictures
all 2021.20220204-1 [8,720 kB]
Get:50 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-extra
all 2021.20220204-1 [13.9 MB]
Get:51 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-plain-
generic all 2021.20220204-1 [27.5 MB]
Get:52 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tipa all 2:1.3-21
[2,967 kB]
Get:53 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-xetex all
2021.20220204-1 [12.4 MB]
Fetched 182 MB in 7s (25.3 MB/s)
Extracting templates from packages: 100%
Preconfiguring packages …
Selecting previously unselected package fonts-droid-fallback.
(Reading database … 121713 files and directories currently installed.)
Preparing to unpack …/00-fonts-droid-fallback_1%3a6.0.1r16-1.1build1_all.deb
…
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1build1) …
Selecting previously unselected package fonts-lato.
Preparing to unpack …/01-fonts-lato_2.0-2.1_all.deb …
Unpacking fonts-lato (2.0-2.1) …
Selecting previously unselected package poppler-data.
Preparing to unpack …/02-poppler-data_0.4.11-1_all.deb …
Unpacking poppler-data (0.4.11-1) …
Selecting previously unselected package tex-common.
Preparing to unpack …/03-tex-common_6.17_all.deb …
Unpacking tex-common (6.17) …
Selecting previously unselected package fonts-urw-base35.
```

```
Preparing to unpack …/04-fonts-urw-base35_20200910-1_all.deb …
Unpacking fonts-urw-base35 (20200910-1) …
Selecting previously unselected package libgs9-common.
Preparing to unpack …/05-libgs9-common_9.55.0~dfsg1-0ubuntu5.13_all.deb …
Unpacking libgs9-common (9.55.0~dfsg1-0ubuntu5.13) …
Selecting previously unselected package libidn12:amd64.
Preparing to unpack …/06-libidn12_1.38-4ubuntu1_amd64.deb …
Unpacking libidn12:amd64 (1.38-4ubuntu1) …
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack …/07-libijs-0.35_0.35-15build2_amd64.deb …
Unpacking libijs-0.35:amd64 (0.35-15build2) …
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack …/08-libjbig2dec0_0.19-3build2_amd64.deb …
Unpacking libjbig2dec0:amd64 (0.19-3build2) …
Selecting previously unselected package libgs9:amd64.
Preparing to unpack …/09-libgs9_9.55.0~dfsg1-0ubuntu5.13_amd64.deb …
Unpacking libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.13) …
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack …/10-libkpathsea6_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libwoff1:amd64.
Preparing to unpack …/11-libwoff1_1.0.2-1build4_amd64.deb …
Unpacking libwoff1:amd64 (1.0.2-1build4) …
Selecting previously unselected package dvisvgm.
Preparing to unpack …/12-dvisvgm_2.13.1-1_amd64.deb …
Unpacking dvisvgm (2.13.1-1) …
Selecting previously unselected package fonts-lmodern.
Preparing to unpack …/13-fonts-lmodern_2.004.5-6.1_all.deb …
Unpacking fonts-lmodern (2.004.5-6.1) …
Selecting previously unselected package fonts-noto-mono.
Preparing to unpack …/14-fonts-noto-mono_20201225-1build1_all.deb …
Unpacking fonts-noto-mono (20201225-1build1) …
Selecting previously unselected package fonts-texgyre.
Preparing to unpack …/15-fonts-texgyre_20180621-3.1_all.deb …
Unpacking fonts-texgyre (20180621-3.1) …
Selecting previously unselected package libapache-pom-java.
Preparing to unpack …/16-libapache-pom-java_18-1_all.deb …
Unpacking libapache-pom-java (18-1) …
Selecting previously unselected package libcommons-parent-java.
Preparing to unpack …/17-libcommons-parent-java_43-1_all.deb …
Unpacking libcommons-parent-java (43-1) …
Selecting previously unselected package libcommons-logging-java.
Preparing to unpack …/18-libcommons-logging-java_1.2-2_all.deb …
Unpacking libcommons-logging-java (1.2-2) …
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack …/19-libptexenc1_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
```

```
Unpacking libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package rubygems-integration.
Preparing to unpack …/20-rubygems-integration_1.18_all.deb …
Unpacking rubygems-integration (1.18) …
Selecting previously unselected package ruby3.0.
Preparing to unpack …/21-ruby3.0_3.0.2-7ubuntu2.11_amd64.deb …
Unpacking ruby3.0 (3.0.2-7ubuntu2.11) …
Selecting previously unselected package ruby-rubygems.
Preparing to unpack …/22-ruby-rubygems_3.3.5-2ubuntu1.2_all.deb …
Unpacking ruby-rubygems (3.3.5-2ubuntu1.2) …
Selecting previously unselected package ruby.
Preparing to unpack …/23-ruby_1%3a3.0~exp1_amd64.deb …
Unpacking ruby (1:3.0~exp1) …
Selecting previously unselected package rake.
Preparing to unpack …/24-rake_13.0.6-2_all.deb …
Unpacking rake (13.0.6-2) …
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack …/25-ruby-net-telnet_0.1.1-2_all.deb …
Unpacking ruby-net-telnet (0.1.1-2) …
Selecting previously unselected package ruby-webrick.
Preparing to unpack …/26-ruby-webrick_1.7.0-3ubuntu0.2_all.deb …
Unpacking ruby-webrick (1.7.0-3ubuntu0.2) …
Selecting previously unselected package ruby-xmlrpc.
Preparing to unpack …/27-ruby-xmlrpc_0.3.2-1ubuntu0.1_all.deb …
Unpacking ruby-xmlrpc (0.3.2-1ubuntu0.1) …
Selecting previously unselected package libruby3.0:amd64.
Preparing to unpack …/28-libruby3.0_3.0.2-7ubuntu2.11_amd64.deb …
Unpacking libruby3.0:amd64 (3.0.2-7ubuntu2.11) …
Selecting previously unselected package libsynctex2:amd64.
Preparing to unpack …/29-libsynctex2_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libsynctex2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libteckit0:amd64.
Preparing to unpack …/30-libteckit0_2.5.11+ds1-1_amd64.deb …
Unpacking libteckit0:amd64 (2.5.11+ds1-1) …
Selecting previously unselected package libtexlua53:amd64.
Preparing to unpack …/31-libtexlua53_2021.20210626.59705-1ubuntu0.2_amd64.deb
…
Unpacking libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libtexluajit2:amd64.
Preparing to unpack
…/32-libtexluajit2_2021.20210626.59705-1ubuntu0.2_amd64.deb …
Unpacking libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package libzzip-0-13:amd64.
Preparing to unpack …/33-libzzip-0-13_0.13.72+dfsg.1-1.1_amd64.deb …
Unpacking libzzip-0-13:amd64 (0.13.72+dfsg.1-1.1) …
Selecting previously unselected package xfonts-encodings.
Preparing to unpack …/34-xfonts-encodings_1%3a1.0.5-0ubuntu2_all.deb …
```

```
Unpacking xfonts-encodings (1:1.0.5-0ubuntu2) …
Selecting previously unselected package xfonts-utils.
Preparing to unpack …/35-xfonts-utils_1%3a7.7+6build2_amd64.deb …
Unpacking xfonts-utils (1:7.7+6build2) …
Selecting previously unselected package lmodern.
Preparing to unpack …/36-lmodern_2.004.5-6.1_all.deb …
Unpacking lmodern (2.004.5-6.1) …
Selecting previously unselected package preview-latex-style.
Preparing to unpack …/37-preview-latex-style_12.2-1ubuntu1_all.deb …
Unpacking preview-latex-style (12.2-1ubuntu1) …
Selecting previously unselected package t1utils.
Preparing to unpack …/38-t1utils_1.41-4build2_amd64.deb …
Unpacking t1utils (1.41-4build2) …
Selecting previously unselected package teckit.
Preparing to unpack …/39-teckit_2.5.11+ds1-1_amd64.deb …
Unpacking teckit (2.5.11+ds1-1) …
Selecting previously unselected package tex-gyre.
Preparing to unpack …/40-tex-gyre_20180621-3.1_all.deb …
Unpacking tex-gyre (20180621-3.1) …
Selecting previously unselected package texlive-binaries.
Preparing to unpack …/41-texlive-
binaries_2021.20210626.59705-1ubuntu0.2_amd64.deb …
Unpacking texlive-binaries (2021.20210626.59705-1ubuntu0.2) …
Selecting previously unselected package texlive-base.
Preparing to unpack …/42-texlive-base_2021.20220204-1_all.deb …
Unpacking texlive-base (2021.20220204-1) …
Selecting previously unselected package texlive-fonts-recommended.
Preparing to unpack …/43-texlive-fonts-recommended_2021.20220204-1_all.deb …
Unpacking texlive-fonts-recommended (2021.20220204-1) …
Selecting previously unselected package texlive-latex-base.
Preparing to unpack …/44-texlive-latex-base_2021.20220204-1_all.deb …
Unpacking texlive-latex-base (2021.20220204-1) …
Selecting previously unselected package libfontbox-java.
Preparing to unpack …/45-libfontbox-java_1%3a1.8.16-2_all.deb …
Unpacking libfontbox-java (1:1.8.16-2) …
Selecting previously unselected package libpdfbox-java.
Preparing to unpack …/46-libpdfbox-java_1%3a1.8.16-2_all.deb …
Unpacking libpdfbox-java (1:1.8.16-2) …
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack …/47-texlive-latex-recommended_2021.20220204-1_all.deb …
Unpacking texlive-latex-recommended (2021.20220204-1) …
Selecting previously unselected package texlive-pictures.
Preparing to unpack …/48-texlive-pictures_2021.20220204-1_all.deb …
Unpacking texlive-pictures (2021.20220204-1) …
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack …/49-texlive-latex-extra_2021.20220204-1_all.deb …
Unpacking texlive-latex-extra (2021.20220204-1) …
Selecting previously unselected package texlive-plain-generic.
```

```
Preparing to unpack …/50-texlive-plain-generic_2021.20220204-1_all.deb …
Unpacking texlive-plain-generic (2021.20220204-1) …
Selecting previously unselected package tipa.
Preparing to unpack …/51-tipa_2%3a1.3-21_all.deb …
Unpacking tipa (2:1.3-21) …
Selecting previously unselected package texlive-xetex.
Preparing to unpack …/52-texlive-xetex_2021.20220204-1_all.deb …
Unpacking texlive-xetex (2021.20220204-1) …
Setting up fonts-lato (2.0-2.1) …
Setting up fonts-noto-mono (20201225-1build1) …
Setting up libwoff1:amd64 (1.0.2-1build4) …
Setting up libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libijs-0.35:amd64 (0.35-15build2) …
Setting up libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libfontbox-java (1:1.8.16-2) …
Setting up rubygems-integration (1.18) …
Setting up libzzip-0-13:amd64 (0.13.72+dfsg.1-1.1) …
Setting up fonts-urw-base35 (20200910-1) …
Setting up poppler-data (0.4.11-1) …
Setting up tex-common (6.17) …
update-language: texlive-base not installed and configured, doing nothing!
Setting up libjbig2dec0:amd64 (0.19-3build2) …
Setting up libteckit0:amd64 (2.5.11+ds1-1) …
Setting up libapache-pom-java (18-1) …
Setting up ruby-net-telnet (0.1.1-2) …
Setting up xfonts-encodings (1:1.0.5-0ubuntu2) …
Setting up t1utils (1.41-4build2) …
Setting up libidn12:amd64 (1.38-4ubuntu1) …
Setting up fonts-texgyre (20180621-3.1) …
Setting up libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up ruby-webrick (1.7.0-3ubuntu0.2) …
Setting up fonts-lmodern (2.004.5-6.1) …
Setting up fonts-droid-fallback (1:6.0.1r16-1.1build1) …
Setting up ruby-xmlrpc (0.3.2-1ubuntu0.1) …
Setting up libsynctex2:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up libgs9-common (9.55.0~dfsg1-0ubuntu5.13) …
Setting up teckit (2.5.11+ds1-1) …
Setting up libpdfbox-java (1:1.8.16-2) …
Setting up libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.13) …
Setting up preview-latex-style (12.2-1ubuntu1) …
Setting up libcommons-parent-java (43-1) …
Setting up dvisvgm (2.13.1-1) …
Setting up libcommons-logging-java (1.2-2) …
Setting up xfonts-utils (1:7.7+6build2) …
Setting up libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) …
Setting up texlive-binaries (2021.20210626.59705-1ubuntu0.2) …
update-alternatives: using /usr/bin/xdvi-xaw to provide /usr/bin/xdvi.bin
(xdvi.bin) in auto mode
```

```
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex
(bibtex) in auto mode
Setting up lmodern (2.004.5-6.1) …
Setting up texlive-base (2021.20220204-1) …
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST…
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN…
mktexlsr: Updating /var/lib/texmf/ls-R…
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4:
/var/lib/texmf/dvips/config/config-paper.ps
tl-paper: setting paper size for dvipdfmx to a4:
/var/lib/texmf/dvipdfmx/dvipdfmx-paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-paper
tl-paper: setting paper size for pdftex to a4: /var/lib/texmf/tex/generic/tex-
ini-files/pdftexconfig.tex
Setting up tex-gyre (20180621-3.1) …
Setting up texlive-plain-generic (2021.20220204-1) …
Setting up texlive-latex-base (2021.20220204-1) …
Setting up texlive-latex-recommended (2021.20220204-1) …
Setting up texlive-pictures (2021.20220204-1) …
Setting up texlive-fonts-recommended (2021.20220204-1) …
Setting up tipa (2:1.3-21) …
Setting up texlive-latex-extra (2021.20220204-1) …
Setting up texlive-xetex (2021.20220204-1) …
Setting up rake (13.0.6-2) …
Setting up libruby3.0:amd64 (3.0.2-7ubuntu2.11) …
Setting up ruby3.0 (3.0.2-7ubuntu2.11) …
Setting up ruby (1:3.0~exp1) …
Setting up ruby-rubygems (3.3.5-2ubuntu1.2) …
Processing triggers for man-db (2.10.2-1) …
Processing triggers for mailcap (3.70+nmu1ubuntu1) …
Processing triggers for fontconfig (2.13.1-4.2ubuntu5) …
Processing triggers for libc-bin (2.35-0ubuntu3.8) …
/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc_proxy.so.2 is not a symbolic
link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_opencl.so.0 is not a symbolic
link

/sbin/ldconfig.real: /usr/local/lib/libtcm_debug.so.1 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_loader.so.0 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbb.so.12 is not a symbolic link
```

```
/sbin/ldconfig.real: /usr/local/lib/libtcm.so.1 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc.so.2 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_level_zero.so.0 is not a
symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_0.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libhwloc.so.15 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_5.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_level_zero_v2.so.0 is not a
symbolic link

/sbin/ldconfig.real: /usr/local/lib/libumf.so.1 is not a symbolic link

Processing triggers for tex-common (6.17) …
Running updmap-sys. This may take some time… done.
Running mktexlsr /var/lib/texmf … done.
Building format(s) --all.
        This may take some time… done.
```

[22]:
```python
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

[23]:
```python
file_path = '/content/drive/MyDrive/Colab Notebooks/FinalProjectFolder'
with open(file_path, 'r') as f:
  content = f.read()
print(content)
```

```
---------------------------------------------------------------------------
IsADirectoryError                         Traceback (most recent call last)
/tmp/ipython-input-3927867712.py in <cell line: 0>()
      1 file_path = '/content/drive/MyDrive/Colab Notebooks/FinalProjectFolder'
----> 2 with open(file_path, 'r') as f:
      3   content = f.read()
      4 print(content)

IsADirectoryError: [Errno 21] Is a directory: '/content/drive/MyDrive/Colab␣
 ↪Notebooks/FinalProjectFolder'
```

```
[21]: !jupyter nbconvert --to pdf "/My Drive/Colab Notebooks/FinalProject/Folder/
      ↪DTSA_Final_Project.ipynb"
```

```
[NbConvertApp] WARNING | pattern '/My Drive/Colab
Notebooks/FinalProject/Folder/DTSA_Final_Project.ipynb' matched no files
This application is used to convert notebook files (*.ipynb)
        to various other formats.

        WARNING: THE COMMANDLINE INTERFACE MAY CHANGE IN FUTURE RELEASES.

Options
=======
The options below are convenience aliases to configurable class-options,
as listed in the "Equivalent to" description-line of the aliases.
To see all configurable class-options for some <cmd>, use:
    <cmd> --help-all

--debug
    set log level to logging.DEBUG (maximize logging output)
    Equivalent to: [--Application.log_level=10]
--show-config
    Show the application's configuration (human-readable format)
    Equivalent to: [--Application.show_config=True]
--show-config-json
    Show the application's configuration (json format)
    Equivalent to: [--Application.show_config_json=True]
--generate-config
    generate default config file
    Equivalent to: [--JupyterApp.generate_config=True]
-y
    Answer yes to any questions instead of prompting.
    Equivalent to: [--JupyterApp.answer_yes=True]
--execute
    Execute the notebook prior to export.
    Equivalent to: [--ExecutePreprocessor.enabled=True]
--allow-errors
    Continue notebook execution even if one of the cells throws an error and
include the error message in the cell output (the default behaviour is to abort
conversion). This flag is only relevant if '--execute' was specified, too.
    Equivalent to: [--ExecutePreprocessor.allow_errors=True]
--stdin
    read a single notebook file from stdin. Write the resulting notebook with
default basename 'notebook.*'
    Equivalent to: [--NbConvertApp.from_stdin=True]
--stdout
    Write notebook output to stdout instead of files.
    Equivalent to: [--NbConvertApp.writer_class=StdoutWriter]
```

```
--inplace
    Run nbconvert in place, overwriting the existing notebook (only
            relevant when converting to notebook format)
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=]
--clear-output
    Clear output of current file and save in place,
            overwriting the existing notebook.
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=
--ClearOutputPreprocessor.enabled=True]
--coalesce-streams
    Coalesce consecutive stdout and stderr outputs into one stream (within each
cell).
    Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=
--CoalesceStreamsPreprocessor.enabled=True]
--no-prompt
    Exclude input and output prompts from converted document.
    Equivalent to: [--TemplateExporter.exclude_input_prompt=True
--TemplateExporter.exclude_output_prompt=True]
--no-input
    Exclude input cells and output prompts from converted document.
            This mode is ideal for generating code-free reports.
    Equivalent to: [--TemplateExporter.exclude_output_prompt=True
--TemplateExporter.exclude_input=True
--TemplateExporter.exclude_input_prompt=True]
--allow-chromium-download
    Whether to allow downloading chromium if no suitable version is found on the
system.
    Equivalent to: [--WebPDFExporter.allow_chromium_download=True]
--disable-chromium-sandbox
    Disable chromium security sandbox when converting to PDF..
    Equivalent to: [--WebPDFExporter.disable_sandbox=True]
--show-input
    Shows code input. This flag is only useful for dejavu users.
    Equivalent to: [--TemplateExporter.exclude_input=False]
--embed-images
    Embed the images as base64 dataurls in the output. This flag is only useful
for the HTML/WebPDF/Slides exports.
    Equivalent to: [--HTMLExporter.embed_images=True]
--sanitize-html
    Whether the HTML in Markdown cells and cell outputs should be sanitized..
    Equivalent to: [--HTMLExporter.sanitize_html=True]
--log-level=<Enum>
    Set the log level by value or name.
    Choices: any of [0, 10, 20, 30, 40, 50, 'DEBUG', 'INFO', 'WARN', 'ERROR',
'CRITICAL']
```

```
    Default: 30
    Equivalent to: [--Application.log_level]
--config=<Unicode>
    Full path of a config file.
    Default: ''
    Equivalent to: [--JupyterApp.config_file]
--to=<Unicode>
    The export format to be used, either one of the built-in formats
            ['asciidoc', 'custom', 'html', 'latex', 'markdown', 'notebook',
'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides', 'webpdf']
            or a dotted object name that represents the import path for an
            ``Exporter`` class
    Default: ''
    Equivalent to: [--NbConvertApp.export_format]
--template=<Unicode>
    Name of the template to use
    Default: ''
    Equivalent to: [--TemplateExporter.template_name]
--template-file=<Unicode>
    Name of the template file to use
    Default: None
    Equivalent to: [--TemplateExporter.template_file]
--theme=<Unicode>
    Template specific theme(e.g. the name of a JupyterLab CSS theme distributed
    as prebuilt extension for the lab template)
    Default: 'light'
    Equivalent to: [--HTMLExporter.theme]
--sanitize_html=<Bool>
    Whether the HTML in Markdown cells and cell outputs should be sanitized.This
    should be set to True by nbviewer or similar tools.
    Default: False
    Equivalent to: [--HTMLExporter.sanitize_html]
--writer=<DottedObjectName>
    Writer class used to write the
                                      results of the conversion
    Default: 'FilesWriter'
    Equivalent to: [--NbConvertApp.writer_class]
--post=<DottedOrNone>
    PostProcessor class used to write the
                                      results of the conversion
    Default: ''
    Equivalent to: [--NbConvertApp.postprocessor_class]
--output=<Unicode>
    Overwrite base name use for output files.
                Supports pattern replacements '{notebook_name}'.
    Default: '{notebook_name}'
    Equivalent to: [--NbConvertApp.output_base]
--output-dir=<Unicode>
```

```
    Directory to write output(s) to. Defaults
                                to output to the directory of each notebook.
To recover
                                previous default behaviour (outputting to the
current
                                working directory) use . as the flag value.
    Default: ''
    Equivalent to: [--FilesWriter.build_directory]
--reveal-prefix=<Unicode>
    The URL prefix for reveal.js (version 3.x).
            This defaults to the reveal CDN, but can be any url pointing to a
copy
            of reveal.js.
            For speaker notes to work, this must be a relative path to a local
            copy of reveal.js: e.g., "reveal.js".
            If a relative path is given, it must be a subdirectory of the
            current directory (from which the server is run).
            See the usage documentation
            (https://nbconvert.readthedocs.io/en/latest/usage.html#reveal-js-
html-slideshow)
            for more details.
    Default: ''
    Equivalent to: [--SlidesExporter.reveal_url_prefix]
--nbformat=<Enum>
    The nbformat version to write.
            Use this to downgrade notebooks.
    Choices: any of [1, 2, 3, 4]
    Default: 4
    Equivalent to: [--NotebookExporter.nbformat_version]

Examples
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    The simplest way to use nbconvert is

            > jupyter nbconvert mynotebook.ipynb --to html

            Options include ['asciidoc', 'custom', 'html', 'latex', 'markdown',
'notebook', 'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides',
'webpdf'].

            > jupyter nbconvert --to latex mynotebook.ipynb

            Both HTML and LaTeX support multiple output templates. LaTeX
includes
            'base', 'article' and 'report'.  HTML includes 'basic', 'lab' and
            'classic'. You can specify the flavor of the format used.
```

```
> jupyter nbconvert --to html --template lab mynotebook.ipynb

You can also pipe the output to stdout, rather than a file

> jupyter nbconvert mynotebook.ipynb --stdout

PDF is generated via latex

> jupyter nbconvert mynotebook.ipynb --to pdf

You can get (and serve) a Reveal.js-powered slideshow

> jupyter nbconvert myslides.ipynb --to slides --post serve

Multiple notebooks can be given at the command line in a couple of
different ways:

> jupyter nbconvert notebook*.ipynb
> jupyter nbconvert notebook1.ipynb notebook2.ipynb

or you can specify the notebooks list in a config file, containing::

    c.NbConvertApp.notebooks = ["my_notebook.ipynb"]

> jupyter nbconvert --config mycfg.py
```

To see all available configurables, use `--help-all`.

[ ]: