# Recommending songs in spotify

A Predictive Analysis
Data analysis course project
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#### **Dataset**

Scraping over 14000 songs from 163 playlists (600 from my playlist) in JSON format from Spotify's API

#### To remove:

- Songs never repeating across playlists
- Songs with missing information
- Playlists with less than 10 remaining songs



2261 songs remained in total from 87 playlists (70 from our playlist)

#### **Extracted stuff**

#### Song information:

	Song ID	Genres	Explicit	Popularity	Dancability	Loudness	Tempo	Acousticness	Energy	Valence	Liveness	Speechiness
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Preprocess all by Standard Scaler

#### Playlist information:

Playlist ID Song ID Added at

# Genres, genres everywhere...

irishpop nashvillesinger-songwriter

alternativerock indierolo classicocchiues blues arrodancehall bebop rock folk afropop newamericana country blues arrodancehall bebop rock folk afropop nigerland blues arrodancehall rock folk afropop dancehall rock folk afropop dancehall dancerock folk afropop dancehall business country blues prilibuildingpop deltablues rock traplatino motown deepnewamericana azonto

163 genres after removing infrequent ones in 502 genres!

A song may have more than one genre:

['album rock', 'classic rock', 'hard rock', 'rock']

#### Embedding:

- Word2Vec (Dim: 20)
- TF-IDF weighted average

```
deepnewamericana
                                                                                                                                                 funkmetal
                                                                                                                                                                                       quietstorm
                                                                                                                                                                       ukcontemporaryr&b
                                                                            poprock
hardrock funkrock beatlesque newwave
                   modernbluesrock irishsinger-songwriter
stompandflutter appalachianfortzbluegulblues glamroppalachianfortzbluegulblues modernfolkrock reggaetonfolkrocksivebluegrass latinhipt southernhiphop panamanianpop garagerock roctsreggae arrosoul calirap ghanajaniphop ukdancehall sottrock rockabilly trapqueen her melanchglofolk canadianindie britipianorockstonfolk rockabilly werggae trap southafricanpop bluegrass canadianamericana
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                                                                                                                                            clustered
                         b bluegrass canadianamericana
ndiecafeporpunk
                                                                                                                                            10 genres
```

# Can we predict genres?

- Train random forest
  - Grid search and 5 fold cross validation

98% accuracy in predicting new genre labels!

country modernall afroswing transport bubbleguirishpop nashvillesinger-songwriter

max depth: 10,

n estimators: 100

```
brillbuildingpop
                                                                                                                                                                                                                                                                                                                                                                                deepnewamericana
                                                                                                                                                                                                                                                                                                                                                                                         funkmetal
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                                                                                                                                                                                                                                                                                                                                                                                                                                               ukcontemporaryr&b
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                                                                                                                                                                                                            psychedelicrock indiecoustica
                                                                                                                                                                                                                                                                                                                                                                                   newromantic
                                                                                                                                                                                                    modernsalsa indierock hiphop
poprock-and-roll reggaetoncolombiano
hardrock funkrock beatlesque newwave
                                                                                                                                                                                                                                                                           colombianpop
modernbluesrock irishsinger-songwriter neomellow dreampop ost-teenpop canadiansinger-songwriter merseybeat anti-folk modernblues acidrock northcarolinaroots acousticpop southernhiphop panamanianpop garagerock rotsreggae notsreggae notsreggae neomellow dreampop neomellow dreampop neomellow modernblues acousticpop southernhiphop panamanianpop garagerock rotsreggae notsreggae neomellow neomello
                                                                                                                                           post-grunge
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                                                                                                                                bubblegumpop
```

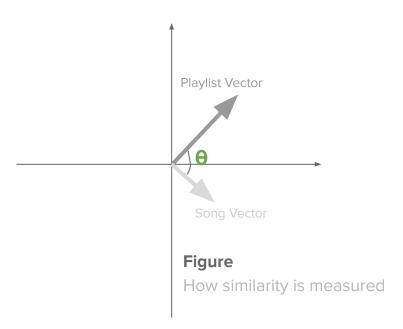
### **Content Based Recommendation**

## KNN based on cosine similarity

#### Create Playlist vector by:

- Averaging my song vectors
- Weighted averaging
  - O "Added At" column... Remember?

Song-feature matrix (1090 rows, 33 columns)



# **Collaborative Filtering Recommendation**

#### **Methods** used

- KNN (same approach, only slightly different)
  - Finding K Nearest Playlists
  - Playlist-song interaction matrix (87 rows, 1090 columns)!
- Matrix Factorization
  - Train SVD with SGD optimization
  - o (87, 20) × (20, 1090) a little better!
- Auto Encoder
  - Encoder + Decoder layer with 20 latent neurons and a custom loss function

5 Fold cross validation used in all

#### **Evaluation**

No labels on recommended songs...

- RMSE & MAE
  - Not perfect for comparing, but good for making sure model is trained.
- Experiment on our playlist
  - Get 10 songs from each recommender
  - O Do we like those songs?

#### Results

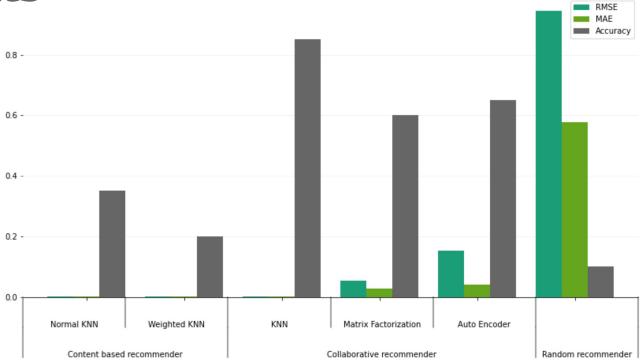


Figure 3: Which recommender Works best?

# Thank you

Follow me on spotify!

**El-Bahramino**