CSE 575

Class Project Presentation

Song Recommender

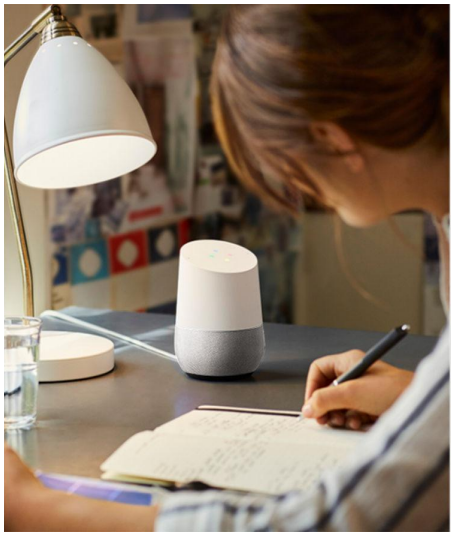
Name	ASU ID	Email	Percentage
Amit Kumar	1211257070	akuma152@asu.edu	16.66
Jithin Roy	1209394885	jroy6@asu.edu	16.66
Mithil Arun	1211219175	marun@asu.edu	16.66
Saisudarsan Yanamandala	1210508686	syanama1@asu.edu	16.66
Sooraj Raja Gopal	1210315246	srgopal@asu.edu	16.66
Tinu Tomson	1211160545	ttomson@asu.edu	16.66

Abstract

- Song recommender based on mood of the user
- Two subproblems:
  - Song classification into different moods based on its attributes
  - Mood prediction based on social network activity
- Machine learning and Natural Language Processing

Motivation

- Era of home automation systems
- Leading towards a future where the home assistant senses mood in conversation and plays music accordingly



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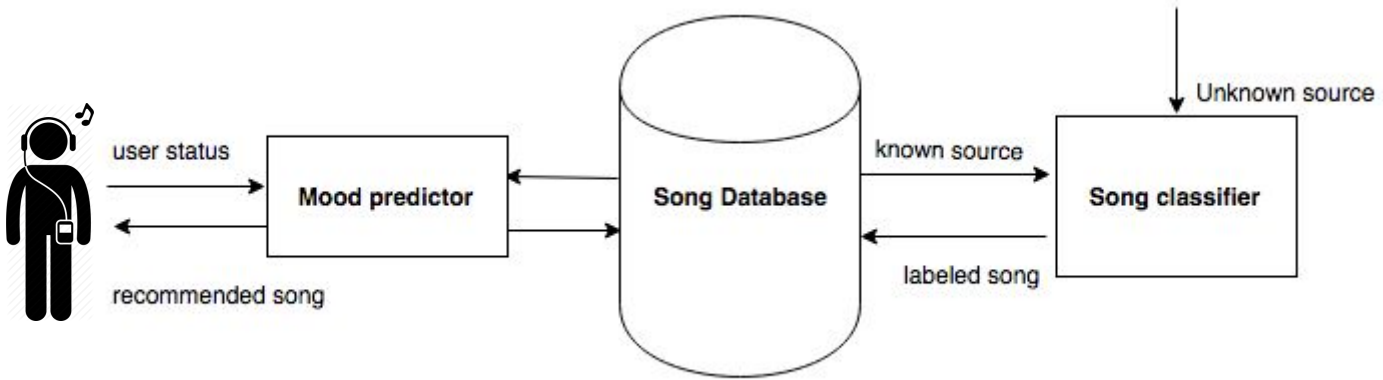
Sources

- “The Million Song Dataset” (https://labrosa.ee.columbia.edu/millionsong/)
- “**Sentiment Labelled Sentences Data Set**” - UCI Machine learning repository (https://archive.ics.uci.edu/ml/datasets/Sentiment+Labelled+Sentences)
- Song Lyrics (http://lyrics.wikia.com/wiki/Lyrics_Wiki)

Challenges faced

- No one reliable source on mood for song classification
- Access to Twitter and Facebook for status updates proved to be tedious
- Needed to reduce training data size due to song lyric unavailability

Architecture



Features for Song Classification

- Tempo
  - speed or pace of the piece in bpm
- Key
  - which of the 12 keys the song is played in
- Loudness
  - avg decibel value of song

Features for Song Classification

- Mode
  - major key or minor key
- Segments Loudness Max
  - max dB value per segment
- Time Signature
  - estimate of number of beats per bar

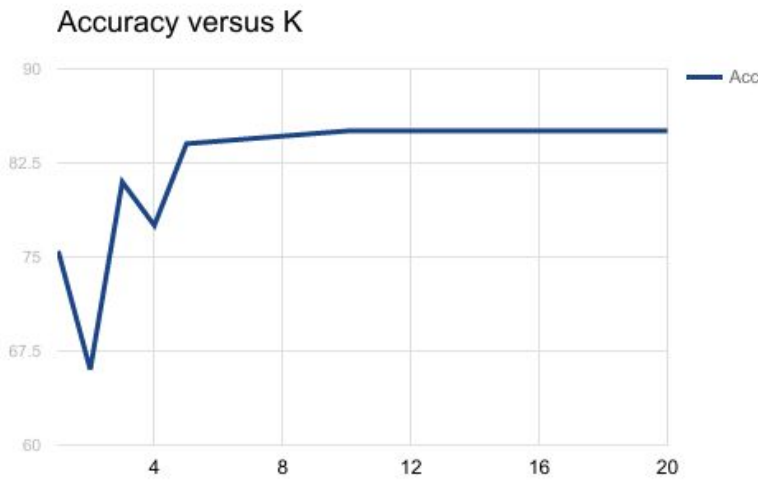
Song Classification

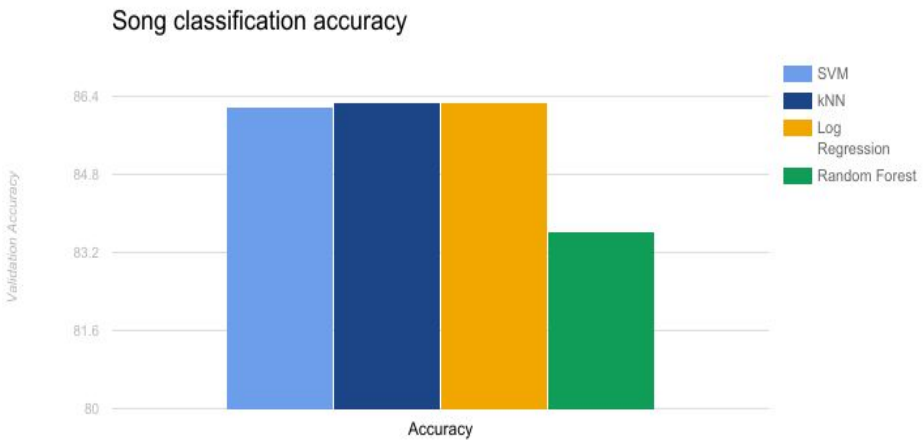
- Class labels were manually generated with the help of lyrics
- The words of the lyrics were tokenized
- Valence values per token were calculated and added up
- Total valence above 0 were labelled as 1(Happy), rest are 0(Sad)

Song Classification

- Used 4 algorithms to compare results:
  - SVM
  - kNN
    - k=200, weights="distance"
  - Logistic Regression
  - Random Forest
    - #trees=10
- Dataset size: 3929

Song Classification Results





Sentiment Analysis

Naive Bayes

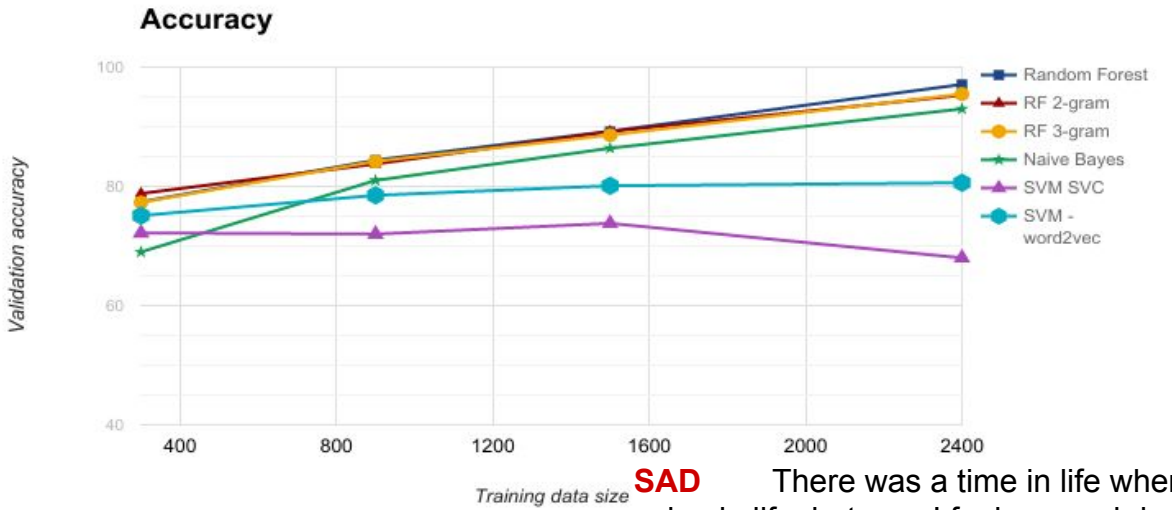
- Normalized sentences by converting everything to smaller case
- Tokenized into a list of words
- Trained based on the probability of whether the sentence is sad or happy given the words

Sentiment Analysis

Random Forest and SVM SVC

- Tokenized into a list of words
- Count the occurrence of words
- Calculate valence score for each words.
- Used count and valence score as features.
  - Normal bag of words
  - TF-IDF
  - N-Gram model
- Changed to word2Vec in SVM so that word similarities are taken into account

Sentiment Analysis Results



SAD There was a time in life when I was walking alone a road and found no value in life, but now I feel so much better and happy.

SAD There was a time in life when I was walking alone a road and found no value in life.

HAPPY I am feeling so awesome

SAD I am so worried

SAD Its very hot outside

HAPPY This movie was actually neither that funny, nor super witty.

Sentiment Analysis Design Choices

- Started with the idea that the probabilities of occurrence of words
- Moved to count the number of occurrence and valence score
  - Random Forest and SVM
- To get the context of the word surroundings, we used n-gram model
- Moved to Word2Vec model which increased the accuracy

Future Enhancement

- Ability to tune model based on new songs
- Recognize more classes of moods
- Mood detection from speech analysis
- Integrate to smart speakers like Amazon Echo or Google Home

Take away

- Sentiment Analysis shows us that word context is important. Traditional classification algorithms don’t work well.
- Need to use long term memory models like RNNT with LSTM.
- Song data sources are huge - need to invest time in fine tuning the features used.

How we did it

Name	ASU ID	Email	Contributions	Percentage
Amit Kumar	1211257070	akuma152@asu.edu	Sentiment Analysis	16.66
Jithin Roy	1209394885	jroy6@asu.edu	Sentiment Analysis	16.66
Mithil Arun	1211219175	marun@asu.edu	Song Classification	16.66
Saisudarsan Yanamandala	1210508686	syanama1@asu.edu	Feature Selection, DB Design	16.66
Sooraj Raja Gopal	1210315246	srgopal@asu.edu	Song Classification	16.66
Tinu Tomson	1211160545	ttomson@asu.edu	Song Classification	16.66

All the team members agree on the team members' contributions in terms of both (a) what s/he did and (b) the percentage

Questions ?