RapVision

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Background and Motivation

Rapping involves the act of creatively construct an elaborate and meaningful story

Since rap's reemergence in 1970, rap has evolved from simple rhyming intended for a party atmosphere, to much more complex word play rhyming to genre-crossing of today that has a global reach

While the genre has a global reach, little have been done to study rap lyrics algorithmically

The aim of this capstone project is to analyze rap lyrics and visually present families of rhyming syllables

Methodology

Analyzing rap lyrics algorithmically requires understanding the different types of rhyming structure; perfect and imperfect rhymes

- *Perfect rhymes* consist of words that share similar stressed vowels; **sight** and **light**
- *Imperfect rhymes* are words that partially share similar sounds; **love** and **move**

Analysis of the process is as follows:

- Tokenize and using CMU dictionary, translate each word into it's phonetic representation
- Devise a rhyme scoring system between each syllables
- Using Markov Clustering Algorithm, group each rhyming syllables according to their phonetic sounds
- Assign a unique color for each rhyme family

Scoring Scheme

Rhyme scores are assigned based on commonality of stressed vowel syllables

Stressed syllable of words is rhymes tend to be heard most strongly between two stressed or emphasized syllables

As such, scoring scheme will follow as such:

- Two matching stressed syllables are given the highest score possibles
- The lowest score is given to two unstressed syllables

Final point allocation is determined based on qualitative evaluation of MCL Algorithm

Visualizing Hamilton

Rap lines from the popular broadway show, Hamilton, are used to test the algorithm

I am the very model of a modern Major General
I've information vegetable animal and mineral
I know the kings of England, and I quote the fights historical

```
i am the very model of a modern major general
i've information vegetable animal and mineral
i know the kings of england and i quote the fights historical
```

I am sailing off to London
I'm accompanied by someone who always pays
I have found a wealthy husband who will keep me in comfort for all my days
He is not a lot of fun,
but there's no one who can match you for turn of phrase
My Alexander

```
i am sailing off to london
im accompanied by someone who always pays
i have found a wealthy husband who will keep me in comfort for all my days
he is not a lot of fun
but theres no one who can match you for turn of phrase
my alexander
```

While the algorithm found not so obvious rhymes, **fun** and **one** (wun), but it also grouped **turn** with **not** and **lot**

Visualizing Kendrick Lamar

Contemporary rap line, Rigamortis (2011)

Got me breathing with dragons
I'll crack the egg in your basket, you bastard
I'm Marilyn Manson don't ask for your favorite rapper
I rapped him and made him Casper, I captured the likes of NASA
My pedigree to fly past ya, I pass the weed to the pastor

```
got me breathing with dragons
i'll crack the egg in your basket you bastard
i'm marilyn manson don't ask for your favorite rapper
i rapped him and made him casper i captured the likes of nasa
my pedigree to fly past ya i pass the weed to the pastor
```

Future Work

Limitations and future improvements:

- Clean up the code, and rewrite functions for improved runtime
- Revisit scoring criteria
- Devise a method to handle slangs and purposefully misspelled words
- Occasionally, word syllabification tool fails to syllabify words; issue to be revisited
- Add additional features, and create a web app

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The End