CS221 Project Proposal: "The Sixteen Machine: Generating Intelligent Rap Lyrics"

INTRODUCTION:
Our project sets out to learn any rapper's *style* of rapping through their lyrics. A rapper's style can be broken down into a lot of characteristics, including flow, rhythm, lyrical content, word choice, and many more. We set out to use algorithms to learn these features from the rapper's lyrics of many, many songs. Then using these learned-features, we will use an algorithm to create a new 'verse' that is supposed to imitate the original rapper's style. This is of personal interest to each of us, as Tony is a self-proclaimed 'hip-hop head' and Aaron aka Teddy Tesla is an aspiring SoundCloud rapper (@TeddyTesla). We are both interested in applying AI to understanding rap and the rappers we listen to.

INPUT/OUTPUT: (see example in appendix)
As input, we'll take all available RapGenius lyrics from a rapper and we'll output a new, fresh verse that sounds as if it could have come from that rapper.

SCOPE:
Theoretically we could target all text works, but we're going to specifically focus on rap and the unique constraints it requires.

EVALUATION:
To evaluate how well our machine is at both rapping and emulating the specific rapper we used as input, we will use a panel of hip hop heads to judge the verses based on rap-specific metrics such as rhyme and rhythm, as well as how similar it is to the original rapper.

BASELINE:
For our baseline, we implemented a simple 2-gram with Kendrick lyrics. As you can see, some of the individual phrases sound very Kendrick like, but it falls woefully flat in terms of both rhythm and rhyme.

ORACLE:
As an Oracle we tried writing as different rappers, emulating their rhythms, rhyme scheme, and subject matter. Each rapper tended to have a different style, so these variables had a whole spectrum that we could distinguish them by.
In this example, we wrote what we thought would be a Kendrick verse. We incorporated a lot of multisyllabic rhymes, and made sure to have a similar subject matter to that of Kendrick, talking about police brutality and killing other rappers on the mic. We also tried to write with syllabic counts that would have a rhythm close to Kendrick's most popular flow.

THE GAP BETWEEN BASELINE AND ORACLE:
As you can see our oracle rap is definitely a rap, which is already more than you can say for the 2-grams verse. It rhymes, and has lines that are relatively the same length. Also, n-gram's lines weren't coherent--there were lots of syntactical mistakes, and lines had little relevance to one

another, something that never happened in our rap. Ours also was exceedingly Kendrick, including a lot of facts about his personal history, such as his birth decade, his gang affiliation, and his city.

CHALLENGES:
Some of the challenges associated with this are defining the "rules" of rap, a fair way to judge rap, and extracting the correct features that would be most useful in distinguishing one rapper from another.

TOPICS:
We hope to use Search States to address this problem. For rhyme, specifically, instead of using a simple n-gram to address what word comes after the end of a line, we will choose the end of the line based on a n-gram with the ends of the previous lines. For rhythm, we will use an API to access the International Phonetic Alphabet spellings of these words. From there, it will not be hard to determine how many syllables a word has. By using n-grams where n > 2, we should also be able to make more coherent rap, both in terms of intraline and interline coherency.

RELATED WORK:

https://arxiv.org/abs/1610.03164
Navigational Instruction Generation as Inverse Reinforcement Learning with Neural Machine Translation

This paper talks a bit about how to make the language that your AI uses sound more natural. Sure they are talking about a navigator, but there is bound to be some transferability between that and our simulated spitter.

https://www.aclweb.org/anthology/P/P16/P16-1054.pdf
Towards more variation in text generation:
Developing and evaluating variation models for choice of referential form

This paper talks a bit about how to add some variety in your generated text so that your text seems more human. This could be super useful--our bot cannot reuse the same rhymes without sounding boring.

http://link.springer.com/chapter/10.1007/978-3-540-92137-0_47
Language Feature Mining for Music Emotion Classification via Supervised Learning from Lyrics

This paper talks more specifically about extracting language from music lyrics. Their AI's purpose is to determine the emotion behind the lyrics, rather than any artist specific characteristics, but it is a good first step to get in the mindset for picking features from the bars of our favorite rappers.

APPENDIX:

INPUT EXAMPLE:

"I place blame on you still, place shame on you still
Feel like you ain't shit, feel like you don't feel
Confidence in yourself, breakin' on marble floors
Watchin' anonymous strangers, tellin' me that I'm yours
But you ain't shit, I'm convinced your tolerance nothin' special
What can I blame you for, nigga I can name several
Situations, I'll start with your little sister bakin'
A baby inside, just a teenager, where your patience?
Where was your antennas?
Where was the influence you speak of?
You preached in front of 100,000 but never reached her
I fuckin' tell you, you fuckin' failure—you ain't no leader!
I never liked you, forever despise you—I don't need you!
The world don't need you, don't let them deceive you
Numbers lie too, fuck your pride too, that's for dedication
Thought money would change you
Made you more complacent
I fuckin' hate you, I hope you embrace it
I swear—"

OUTPUT EXAMPLE: (from n-grams baseline)

"We all my life on tour, ya bish
Crawled under stress days
And I'm behind bars
That considered the far you believe in time ago
Is your mind, you're very welcome
Ah yeah, fuck your ways deceitful
Church me tell you hit the fucking frightening
Hood nigga shopped in the grind for eternity, return of the police relaxed"
So many artists gave her soon as fucked up, shut the car then looked at a fuck?
We made a meteor speed dial, I think she on fours
Enthused by a fight he get a house or die
Anybody can water
And I'm followed by the street from me with the lions start rhyming ,ya bish
That's what when we was
Making sure your heartbeat, it either caught me
Rock on your game right
So I see the mirror and y'all fucks never should bite their sorrows"

ORACLE EXAMPLE: (wriiten by us)

"I'm a product of the 80s, grew up on slim shady
Having dreams of a Mercedes, no wonder I turned out crazy

I used to be blind and underground, something like a mole
But now that my eyes are open I don't fuck with nobody but Cole
Born sinner, but I still act like I be innocent
Kill your favorite rapper, deadly with a pen
Pussies liking other pussies, group of lesbians, them
But should be fightin' popo till feds be in the pen
Cause they shooting first and asking questions never
Don't really care whether or not a nigga is clever
Where's the logic in that? I'm feeling under pressure
They must be jokin', but I'm no Heath Ledger
Sick of these clowns runnin round, this aint gotham
If a nigga frown, gun 'em down, this is Compton
I grew up around Pirus, I was drowning in bloods
Now I drown in pussy and all my haters drownin in mud"