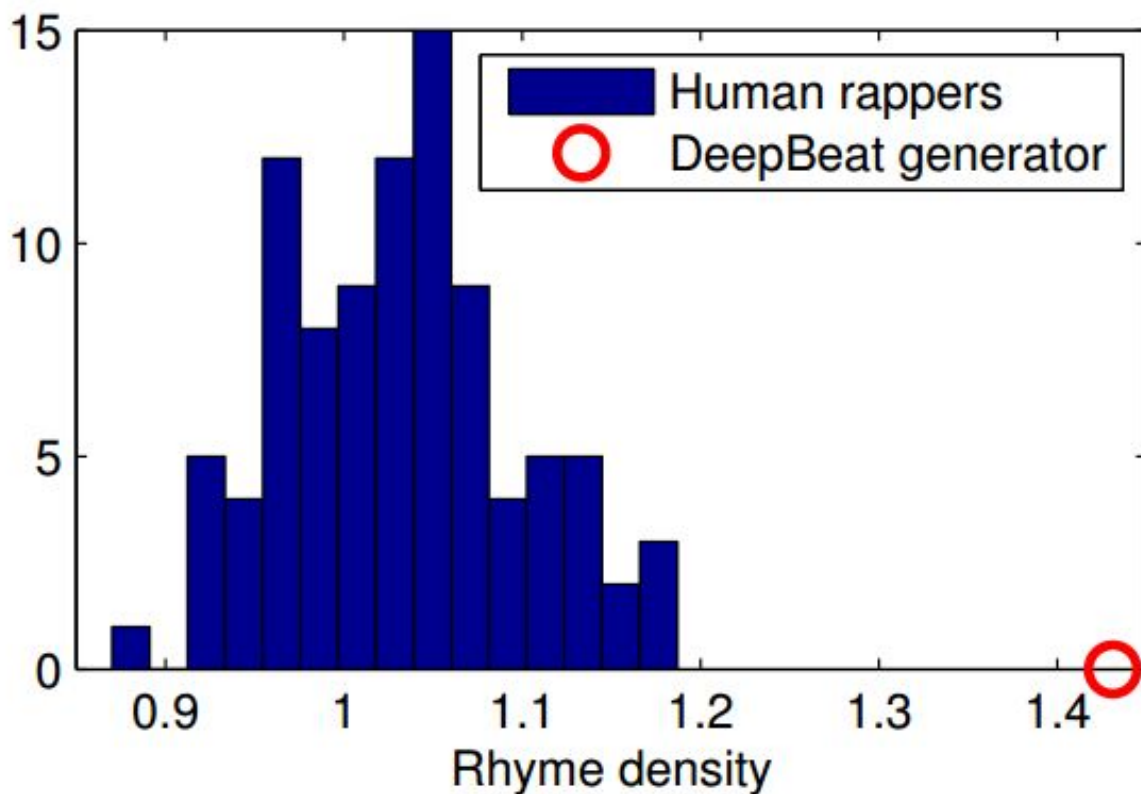


# A computer algorithm that mines rap lyrics to create its own song

May 22 2015, by Bob Yirka



Rhyme density by rapper. Credit: arXiv:1505.04771 [cs.LG]

(Phys.org)—A team of researchers working at Aalto University in Finland has devised an algorithm that mines a database full of rap songs, picks lines from them based on rhyming and produces a new song of its

own. The team has written a paper on their project, which they call DeepBeat, and have uploaded it to the preprint server *arXiv*.

Rap music, once thought to be a momentary blip on the music scene radar, has clearly made a mark, with artists from around the world mixing and matching lyrics, generally in some sort of rhyming fashion, to express themselves, and in some cases, reap the rewards formerly reserved for rock or [pop stars](#). The process by which rap comes about is still somewhat of a mystery—the human brain is still largely a mass of intrigue, but some parts of it are clear—it has to have a steady beat, a storyline of some sort, and some type of rhyming scheme. It was those clear rules that got into the heads of the researchers at Aalto, reminding them of computer coding. That led to some research on rap music in general and then to an effort to have a computer create its own rap songs.

The research consisted of gathering over 10,000 rap songs, with over 100 artists represented and putting the lyrics into a database. Then, routines were written and executed that looked at rhyming in the songs, most particularly those called assonance, which is where similar vowel sounds are repeated, e.g. crazy and baby. The team found that such rhyming was rampant in the rap lyrics, and because of that decided to make it a feature of their song writing algorithm.

Before that algorithm could be written, however, the team had to first create a [neural network](#) to examine the lyrics in the database and to learn something about the rhyming that was present in them and where it was placed, etc. Then the [algorithm](#) was written, which works by scanning the lyrics database then using information from the neural network to pick a line of [lyrics](#) to use—over and over until a complete song has been written (16 lines).

The songs written do indeed resemble rap songs, which makes sense—all

of the lines in them are from popular rap songs, but, what the songs most definitely lack, is a clear storyline, leaving them rhymeless and steady, but bereft of the emotion that is the hallmark of a good rap song.

**More information:** DopeLearning: A Computational Approach to Rap Lyrics Generation, arXiv:1505.04771 [cs.LG] [arxiv.org/abs/1505.04771](https://arxiv.org/abs/1505.04771)

## Abstract

Writing rap lyrics requires both creativity, to construct a meaningful and an interesting story, and lyrical skills, to produce complex rhyme patterns, which are the cornerstone of a good flow. We present a method for capturing both of these aspects. Our approach is based on two machine-learning techniques: the RankSVM algorithm, and a deep neural network model with a novel structure. For the problem of distinguishing the real next line from a randomly selected one, we achieve an 82 % accuracy. We employ the resulting prediction method for creating new rap lyrics by combining lines from existing songs. In terms of quantitative rhyme density, the produced lyrics outperform best human rappers by 21 %. The results highlight the benefit of our rhyme density metric and our innovative predictor of next lines.

Via [Arxiv blog](#)

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Citation: A computer algorithm that mines rap lyrics to create its own song (2015, May 22)  
retrieved 25 April 2024 from  
<https://techxplore.com/news/2015-05-algorithm-rap-lyrics-song.html>

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