

Embedding models applied to musical corpora

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MLCS Summer School 2017

Embedding models of natural language identify the words of a finite vocabulary with points in a real-valued vector space by ingesting a corpus of language, represented as a sequence of words.¹ The objective function that underlies these models promotes the property that words which are used in similar contexts in the corpus are represented by nearby points in the outputted embedding space. Because words with similar meanings tend to occur in similar contexts, the distance between two points in the embedding space corresponds loosely to the degree of similarity between their associated vocabulary words. Preliminary work with musical corpora suggests that these models also exhibit interesting regularities when trained on sequences of chords.²

In the field of natural language processing, these models are evaluated on their performance in analogical reasoning tasks, which use vector arithmetic and nearest-neighbor techniques to propose solutions to analogies of the form: “bad is to good as sad is to ?” When the vocabulary is not formed of words but, say, chord tokens, how do we evaluate embedding models of music? In my talk I demonstrate what embedding spaces of music look like when trained on several symbolic corpora, representing a selection of musical styles. Then I discuss some provisional solutions to this question.

¹The idea of using a vector space model (VSM) to capture regularities in language dates to at least 1970. Interest in this family of language models was recently revived by the publication of a method for constructing these vector space models that is scalable to large vocabularies and very large corpora (billions of tokens). See, for example, Mikolov, Tomas, Ilya Sutskever, Kai Chen, Greg S. Corrado, and Jeff Dean. “Distributed representations of words and phrases and their compositionality.” In *Advances in Neural Information Processing Systems* 26, pp. 3111–3119. 2013.

²See, for instance: Cheng-Zhi Anna Huang, David Duvenaud, and Krzysztof Z. Gajos, “ChordRipple: Recommending Chords to Help Novice Composers Go Beyond the Ordinary,” in *Proceedings of the 21st International Conference on Intelligent User Interfaces, IUI 16* (New York, NY: ACM, 2016), 241–250.