PRODUCTION VALUE

Identifying Record Producers from Audio Data

Maxwell Fisch

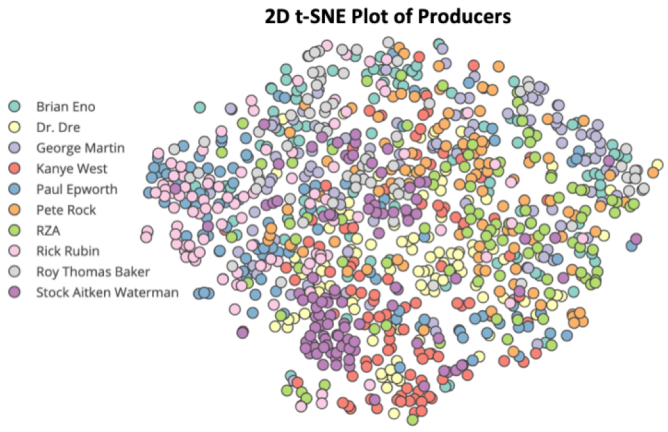
Background

A record producer controls the creation of a music album. Each music producer leaves a sonic fingerprint on every album they produce. Production Value seeks to identify and quantify that signature. This model could be used for:

- **Music discovery:** aiding Spotify and Pandora users in finding music they like.
- **Music publishing:** helping record labels identify and distribute royalties to song collaborators.

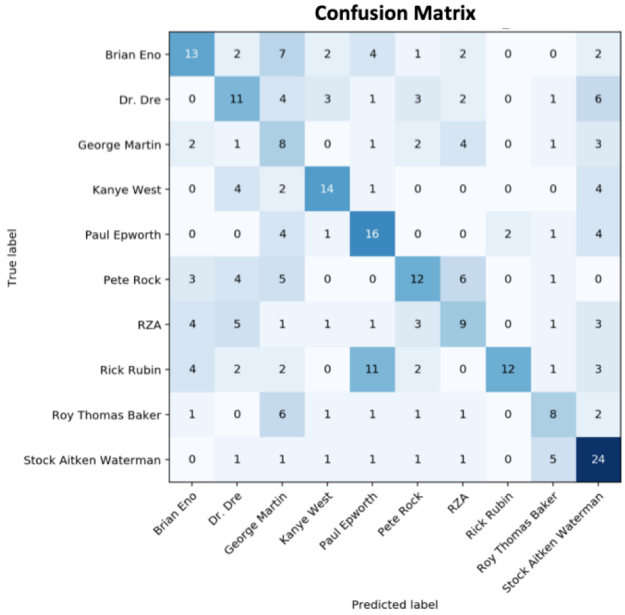
Approach

- 1000 songs from 10 producers (100 songs each) were chosen.
- 30-second snippets of audio from Spotify's API were processed and transformed into Mel-Cepstral Frequency Coefficients (MFCCs) – a featurization that roughly translates to timbre.
- Principal Component Analysis (PCA) reduced dimensionality (24k features → 12).
- K-Nearest Neighbors (KNN) classification was used to classify the record producers.



Results and Analysis

- KNN model multiclass accuracy (10 balanced classes) was 44% compared to a baseline of 10%.
- Producers and songs cluster in MFCC-space. Some producers have characteristic sound (e.g. Stock Aitken Waterman), others are diverse (e.g. George Martin).
- Future improvements:
  - Deconvolution of variables (e.g. Artist, Album, Genre) via nuanced feature engineering.
  - Neural Network Model with Increased Scale (>100k songs)



Tech Stack: python, mongoDB, NumPy, matplotlib, Pandas, Spotify, librosa, plotly, scikit-learn

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Project Links: http://github.com/mhfisch/production-value | http://www.production-value.com

MAXWELL FISCH

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DATA SCIENTIST

Data Scientist with an extensive background as a Root Cause Failure Analyst with a history of highly analytical work. Proven success in combining modern data science tools with a wide breadth of engineering skills. Demonstrated career history of exceeding project deliverables and corporate performance metrics.

Python Pandas Numpy | SQL | MongoDB | AWS Spark | Matplotlib Plotly Seaborn | SKlearn SciPy

DATA SCIENCE EXPERIENCE AND PROJECTS

Production Value **2019**

Data Science Capstone Project

Identifying Record Producers from Audio Data Using Machine Learning

- Accurately predicted record producer 4 times better than the baseline.
- Built a platform that queries audio data from Spotify and returns likely producers and similar songs based on a KNN model. See the whole project at github.com/mhfisch/production-value.

Galvanize **2019**

Data Science

12 weeks of immersive data science coursework, case studies, and projects.

- Mastered fundamentals of modeling, machine learning, hypothesis testing, and linear algebra.
- Extensive experience with Python libraries, including: Numpy, Pandas, pyspark, PyMongo, Scikit-learn, Statsmodels, Scipy, Matplotlib, Seaborn, Nltk (Natural Langauge Toolkit), and Beautifulsoup.
- Learned industry workflow tools and best practices, utilizing Git, Unix, Anaconda, bash scripting, SQL, MongoDB, AWS, and Spark.

PROFESSIONAL WORK

Western Digital **2016 – 2018**

Senior Engineer

Determined root cause in failure analysis for customer return hard drives via materials science and data analysis.

- Published engineering reports and communicated failures to lab managers, customers, and executives.
- Isolated failure sources on flagship product by utilizing materials characterization resulting in 75% reduction in failure.

Levi Lab, UC, Santa Barbara **2012 – 2015**

Graduate Research Fellow

Built apparatus and designed experiments for measurement of high-temperature water vapor transport of Ca-Mg-Al-Si (CMAS) Oxides.

- Demonstrated a novel vapor-transport CMAS ingress mechanism using a custom experimental rig.
- Analyzed infiltration of CMAS oxides with thermal barrier coatings via materials characterization and microscopy.

Cooper Bussmann **2011 – 2011**

Engineering Intern

Conducted a design of experiments for electrolytic super capacitor materials and suggested design improvements.

- Optimized super capacitor capacity and reduced leakage through a DOE varying materials selection and capacitor design.

Maboudian Lab, UC Berkeley **2010 – 2012**

Undergraduate Researcher

Qualified failure mechanisms of a MEMS devices

- Presented results at a conference
- Co-authored three papers.

EDUCATION

Master of Science in Materials, UC Santa Barbara
NSF Graduate Research Fellow. Overall GPA: 3.79|4.00

Bachelor of Science in Chemical Engineering and Materials Science, UC Berkeley
Certificate in Technology and Entrepreneurship from Center for Entrepreneurship and Technology.
Regents' and Chancellor's Scholar, Overall GPA: 3.70|4.00

Extra Interests: Theater, Music, Cooking, Board Games