

Ryan Saxe

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EXPERIENCE

PepsiCo - *Senior Machine Learning Research Scientist* Oct. 2020 - Present

- Research lead on Product Similarity. Currently focusing on embedding regularization techniques.

PepsiCo - *Data Scientist* Jul. 2019 - Oct. 2020

- **Marketing Attribution:** Built a framework for training deep learning systems with economic priors.
 - Created a Neural Additive Model for learning ROI curves to inform ad-spend reallocation.
 - Reallocation yielded +25% return on ad-spend and 15% incremental sales lift on Amazon.
 - Incentivized learning similar curves for similar products via a novel regularization method.
- **Net Revenue Management:** Iterated on Marketing Attribution architecture to learn price elasticity.
 - Reduced mean absolute error of sales forecast by 20% in comparison to prior pricing models.
 - The first model at PepsiCo to achieve elasticity over 95% in line with business expectations.
 - Learned elasticities are being used to inform the 2021 pricing agenda for Frito Lay's portfolio.
- **Product Similarity:** Designed a multi-modal Graph Embedding model using CNNs for NLP.
 - Achieved 99% accuracy on predicting consumer behavior on Amazon.
 - Presented embeddings as 3D-visualization clusters via T-SNE to PepsiCo Leadership, who confirmed that cluster and product distances properly reflect their expectation of "similarity".
 - Embeddings are used to learn product cannibalization as a part of Net Revenue Management.

RiskEcon Lab for Decision Metrics, NYU - *Technical Research Assistant* Sep. 2017 - Jul. 2019

- Co-authored a Gait Recognition paper with David Mordecai, PhD and Samantha Kappagoda, PhD.
- Researched applications of Machine Vision for real-time risk assessment of the industrial athlete.

Dept. of Child and Adolescent Psychiatry, NYU - *Research Intern* May 2016 - Jan. 2017

- Performed regional brain entropy analysis of fMRI data to study Intelligence, Personality, and PTSD.
- Brain entropy study results were published as a poster in [Nature's Neuropsychopharmacology](#).

Stylesage - *Machine Learning Intern* Jul. 2014 - May 2016

- Created ensemble of multiclass SVMs structured as a tree for hierarchical clothing categorization.
- Improved average per-class AUC ROC to over 98%. The best prior model achieved less than 90%.

PROJECTS

Magic: The Gathering (MTG) Recommender System - [Github Repository](#) Mar. 2020 - Apr. 2020

- Designed a denoising autoencoder for recommending cards. Model in production on [CubeCobra](#).
- Learned an embedding for each MTG card via data augmentation and KL-Divergence.

Magic: The Gathering (MTG) Draft AI - [Github Repository](#) Oct. 2019 - Jan 2020

- Designed an AI via Differential Programming for MTG Draft. Results explained in this [blog post](#).
- The AI won an event. As far as I know, this is the first case of AI successfully competing in MTG.

EDUCATION

New York University - *Master of Science in Computer Science* Sep. 2017 - Dec. 2018

- **GPA:** 3.9
- **Masters Thesis:** Classifying the Quality of Movement via Motion Capture and Machine Learning.

New York University - *Bachelor of Arts in Computer Science and Mathematics* Sep. 2013 - May 2017

SKILLS

- **Programming Languages:** Python, Matlab, R, SQL, Java, Scala, C++, JavaScript, HTML, CSS
- **Packages:** TensorFlow, Keras, PyTorch, NumPy, Pandas, Scikit-Learn, Spacy, SciPy, PySpark, NLTK, XGBoost, JAX, Gensim, Matplotlib, Seaborn, Plotly, Flask, Django, BeautifulSoup, Hypothesis
- **Mathematics:** Linear Algebra, Statistics, Topology, Calculus, Numerical Analysis, Abstract Algebra