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.
  - Embeddings were incorporated in Net Revenue Management's product cannibalization model.

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