Estella Xu

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EDUCATION

Northwestern University | Evanston, IL — Expected June 2026
B.A. in Mathematics and B.A./M.S. in Computer Science
GPA: 3.68/4.0 | **Dean's List**
Relevant Courses: AI & ML, Data Science Pipeline, Scalable Software Architectures in the Cloud, Database Systems, Data Structures and Algorithms, Optimization, Math in Finance

SKILLS

Technical: Python, C/C++, C#, SQL, JavaScript, R, XGBoost, Pandas, NumPy, TensorFlow, Scikit-learn
Microsoft Office, Amazon Web Services (RDS, S3, Lambda, EC2), REST APIs, Git, Linux, LaTeX, Excel
Languages: Fluent in English and Mandarin

WORK EXPERIENCE

PrizeSole, *Software Engineer Intern* — June - August 2024

- Implemented full-stack features for a startup of 30+ employees to build an online shoe store offering discounts and sweepstakes raffles to subscribers.
- Developed a front-end app using Nuxt.js, using frameworks such as TailwindCSS for an enhanced user interface.
- Built a checkout form using PrimeVue components. Integrated the Stripe API to ensure secure transactions.
- Used AWS Lambda functions with the API Gateway to create serverless back-end services, including functions to add users to the database upon sign-up for efficient and scalable user management.

Northwestern's 80th and 81st Dolphin Show, *Director of Sales and Promotions* — September 2022 - June 2024

- Analyzed sales patterns in Excel to increase sales for the nation's largest student-produced musical (125 members).
- Sold 3,525 tickets with a gross of $61,195, generating more revenue than any previous year of the Dolphin Show.
- Piloted inclusive ticketing with a new pay-what-you-can system, providing 70+ students with reduced price tickets.
- Led a team of 6 members; directed weekly meetings and created video tutorials on Excel features.

TECHNICAL PROJECTS

Machine Learning Projects — *Python, numpy, Regression, Classification, Reinforcement Learning*

- Built Perceptron, Decision Tree (ID3), Naive Bayes, Polynomial Regression, and k-NN models.
- Developed a multi-layer perceptron with forward/backward pass, ReLU, regularization, and squared error loss.
- Created custom metrics for classification, information gain, fairness, and loss; implemented cross-validation.
- Designed a nonlinear feature transformation to enable linear models to classify complex patterns (e.g., spiral dataset).
- Built and tuned reinforcement learning algorithms in Gymnasium environments; analyzed hyperparameter effects and fairness tradeoffs.

Fridge Application in Amazon Web Services — *Python, JavaScript, AWS, RESTful APIs*

- Built an application allowing users to keep track of items in their fridge and create grocery lists based on ingredients needed for uploaded PDF recipes. Extracted text from images or non-PDF recipe formats.
- Used S3 to store PDFs and RDS to track users following practices for RESTful APIs. Added user authentication.
- Wrote client-side Python code and AWS Lambda functions to create a "serverless" and event-driven architecture.
- Created a similar project with a web server tier in JavaScript using Node.js and Express frameworks.

Advertisement Conversion Modeling — *Python, XGBoost, GridSearchCV, pandas, sklearn*

- Implemented functions to clean conversion and non-conversion datasets using Pandas dataframes. Performed data analysis by writing functions to compare continuous and categorical variables (e.g., conversion by zip code).
- Built one classification model using XGBoost and another using GridSearchCV to predict the conversions and non-conversions of advertisements given features such as zip code, browser, etc.
- Trained and tested the classifier by splitting conversion/non-conversion datasets. Achieved ROC AUC score of 0.88.

BusTub Relational Database Implementation — *C++, Database Systems*

- Built key features of the BusTub relational database system.
- Implemented a buffer pool manager to efficiently manage database pages in memory, handling page replacement policies and ensuring thread safety with latches.
- Developed a B+Tree data structure allowing for storage of pages, supporting search, insertion, and deletion.
- Implemented query execution components using iterator-based execution models (e.g. insertion/deletion, joins, sorting, and aggregates) to process SQL queries.