Henry (Hanxiang) Pan

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Work Experience

University of Pennsylvania
Philadelphia, USA | Remote

Research Assistant (Under Prof. Barry G. Silverman's StateSim Project) *May 2020 - Aug. 2020*

- **Research:** Analyzed an monolithic application; identified inefficient data flow and researched technologies to implement the StateSim Service
- **Architecture:** Drafted an architecture proposal for the StateSim service that supports file sharing, user management and authentication
- **Implementation:** Developed the StateSim service business logic in Python; implemented a GraphQL API in Python Graphene; achieved a clearer division of application responsibilities and unified client-server communication into one avenue
- **Data:** Designed MySQL database schema and developed Object Relationship Mapping (ORM) models in SQLAlchemy to support the proposed use-cases, which established a consistent client-server data format and data storage as a single source of truth
- **Prototyping:** Developed a prototype of a client application for service functional testing; developed an application loader module that replaced unresponsive loading with interactive user authentication and data sync

ViewFin
Toronto, Canada | Remote

Software Engineer *May 2019 - July. 2020*

- **Architecture:** Designed the architecture for a cryptocurrency trading platform and implemented data processing, signal computation and strategy execution modules that supports running a swarm of generic multi-strategy agents in parallel across multiple exchanges
- **Dataflow:** Established a websocket communication pipeline both among internal components and with external services using Python
- **Infrastructure:** Developed a multithreaded backtesting tool in Python, continuous integration (CI) pipeline using Docker, log monitoring with ElasticSearch/Logstash/Kibana (ELK) and a dashboard for tracking live and backtesting trading performance using React and Node.js

Paymentus
Toronto, Canada

Application Engineer (Team Lead) *Nov. 2017 - Aug. 2018*

- **Framework:** Analyzed 100+ application feature flows for over 1000+ generic and custom billers with emphasis on complexity and reusability to identify areas for component testing; designed the first end-to-end (E2E) testing framework; implemented core libraries for developing data-driven tests in Node.js, Puppeteer and Jest; containerized the testing environment with Docker for the CI pipeline
- **Full-stack:** Implemented generic UI form components in React and API/microservices in Node.js for the biller self-onboarding feature
- **Leadership:** Managed and mentored a team of 7 test engineers and led their team scrum meetings; conducted 10+ phone/in-person interviews

Citigroup (Velocity Desktop Trading Application Team)
Toronto, Canada

Software Developer / Technology Analyst *Jun. 2016 - Nov. 2017*

- **Architecture:** Investigated and implemented a distributed cache architectural change from a peer-to-peer (P2P) model to an efficient client-server model, which reduced component startup-time and latency by 9X and mitigated deadlocks
- **Back-end:** Developed and enhanced server-side search functionality for interest rate swaps (IRS), bonds and internal financial instruments in Java and Spring; migrated a legacy data source for 300+ IRS products and added support for 200+ non-benchmark IRS products by redesigning field mappings and by implementing reference data enhancements to support consistent order flow for downstream components
- **Front-end:** Developed an Electron/React configuration management tool that enables finding and editing via a centralized search bar

Projects & Research

BrawlStars AI: Generated gameplay data manually and implemented object detection algorithms to identify player/ally/enemy positions and visual rewards for supervised learning; implemented a reinforcement learning (RL) environment and deep Q-learning agent in Python/Tensorflow

OpenAI Gym: Implemented a RL agent to solve *Acrobot-v1, MountainCarContinuous-v0, Pendulum-v0* achieving average leaderboard performance

Self-play Tic-tac-toe: Created two RL self-playing agents in Python, which converged to equilibrium and perfectly beated the minimax algorithm

Benefits of Group Sparsity in Deep Learning: Researched and experimented with neural network regularization methods on three datasets, MNIST Handwritten Digits, Forest Covertype, Sensorless Drive Diagnosis, which reduced network size by 37% while improving accuracy by 1%

Trading with Machine Learning: Implemented neural networks for price prediction at three different abstraction levels - Python Numpy, Keras and Tensorflow; leveraged RL algorithms to devise trading strategies in Python/Tensorflow

Technical Blog: Documented my research/learning experiences that showcases technical design, experiments, challenges and future steps

Education

University of Pennsylvania
Philadelphia, USA

Master of Science in Engineering, Computer and Information Science (CIS) *Aug. 2019 - Exp. Dec. 2020*

- **Relevant Courses:** Machine Learning, Reinforcement Learning, Deep Learning, Computer Vision, Algorithmic Game Theory

University of Western Ontario | Richard Ivey School of Business
London, Canada

Bachelor of Science, Honors Specialization in Computer Science and Minor in Economics *Sept. 2014 - Apr. 2016*

(Discontinued) Bachelor of Arts, Honors Business Administration (HBA) *Sept. 2011 - Apr. 2014*

- **Thesis:** *Enhancing Food Image Recognition for Nutrition Analysis* - surveyed various image feature extraction and normalization techniques to improve overall image recognition accuracy; achieved a 10-class top-1 image classification error of 1.93% using convolutional neural networks and support vector machine (SVM) after cross-validation and parameter-tuning in MATLAB