Vineet Vinayak Pasupulety

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EXPERIENCE

AMAZON | Research Scientist | August 2019 - Present | Seattle, WA

- Worked in the Communications AI team under Alexa AI
- **FIRM**: Protecting 350 million Alexa users from 175k monthly unintended/false invocations
  - Analyzed 250k customer utterances in **Amazon SQLite** and root caused 6 data quality issues affecting 1st generation supervised models, thus improving annotator efforts and reducing annotation time from 10 hours/1000 utterances to 6 hours
  - Automated workstreams in **Bash** to get high quality offline training/validation/testing data using **AWS Kinesis, S3 and CloudWatch** within 2 hours (previously 3 days)
  - Performed extensive ASR and NLU feature search in Alexa's data stores that resulted in adding 16 new features and discarding 7 older ones, while producing documents with info on future search efforts, engineering owners of these features mechanisms to streamline engineering effort to make such data available at runtime
  - Trained and analyzed 2 **Anomaly Detection** models in **Scikit-Learn** over **SageMaker CLI** and designed 27 experiments over 2 years that lifted model precision from 35% to 76%, thus reducing the number of rejected true invocations by 69k (22k lesser) per month and catching 76k (45k more) false invocations per month
  - Produced robust production code for data parsing, featurization, training and inference with extensive unit testing for fast and reproducible packaging of training artifacts into production pipelines/infrastructure setup without scientist intervention
- **Affinity**: Making large scale recommendations on Alexa app/devices for increased skill discovery
  - Produced 5 point-of-view data analyses from customer usage, profile clickstream data
  - Designed 3 novel True Success Rate metrics to define model success for adoption, discovery and engagement; helped partner teams design A/B tests on custom audiences and production logic
  - Built proof-of-concept **Collaborative Filtering** model in **PySpark** on **EMR** with easy reproducability
  - Built production ready model that increased card recommendations (over rule based systems) by 12.75M, resulting in 1.8M customers trying atleast 1 new Comms skill monthly, and 3k new customers monthly
  - Onboarded new scientists to model mechanisms and developed **Contextual Multi-Armed Bandits** strategy for future models across international locales
- **WAY**: Forecasting the best devices to reach customers amongst several devices
  - Performed data analysis to root cause customer frustrations due to miscommunications to wrong devices in 750k monthly utterances
  - Built a prototype in **PyTorch** for a time series forecasting model based on **GRU-ODE-Bayes** that reduced reported frustrations by 80%
- Led team initiatives to increase team morale and efficiency
  - Mentored a team of 4 engineers in ML science by providing support for onboarding to existing ML team projects, literature reviews, 1-1 guidance, MLScience/Ops talks, presentations etc.
  - Built templates to make science experiment documentation quick to write+relevant for future science, interesting for readers, thus increasing science experiments by 24%, and reduced documentation time from 2 days to 3 hours.
  - Built ticket mechanisms to help scientists focus on ambiguous science work, thus increasing commit-to-deliver ratio from 33% to 54% in every sprint
  - Interviewed L5 scientists for our team
  - Reviewed code commits of team of 8 scientists and engineers

AMAZON | Research Intern | May - August 2018 | Boston, MA

- Worked in the Conversational AI team in Alexa AI Research under **Dr. Alborz Geramifard**
- Designed deep NLP models to capture sentiment in unique dialogue turns in a context-sensitive setting; provided this as a reward signal to improve Alexa's turn-level dialogue policy
- Curated datasets of 500 dialogues and 7000 user utterances to capture live utterance characteristics
- Developed with **PyTorch** as a deep learning classifier for an Alexa skill called **MovieBot**.

ADOBE | Research Intern | May - August 2017 | Bangalore, India
- Designed deep learning models to capture complex edits Photoshopped onto natural images;
- Wrote web crawlers to create curated datasets of 9000 images, 1300 Photoshop tools & 178 tutorials
- Performed Dependency Parsing/Vector Space Analysis/Topic Modelling to map Photoshop tool-effect-region tuples into meaningful tutorial steps for novices
- Developed with **TensorFlow/NLTK/OpenCV and D3** for plugin for Photoshop CS6. Patent Submitted.
- Awarded **"Most Creative Research Project 2017"** amongst 23 teams at Adobe BDExperience Labs

RESEARCH

VISUAL INTELLIGENCE LAB | Graduate Student Researcher | August – December 2018
- Working with **Dr. Devi Parikh**, **Dr. Stefan Lee** and **Dr. Peter Anderson** on using Domain Randomization to improve reinforcement learning agents abilities on a task called **EmbodiedQA**
- Embodied Question Answering is a new AI task where an agent is spawned at a random location in a 3D environment and asked a question ("What color is the car?"). In order to answer, the agent must first intelligently navigate to explore the environment, gather information through first-person (egocentric) vision, and then answer the question ("orange").
- Built using **PyTorch**. Engineered the training framework to permit dynamic domain randomization - choosing different dynamics with a variety of possible options during training so that the real world appears to be another variation of the randomized training domains

DATA ANALYTICS & SIMULATION LAB | Graduate Student Researcher | August 2017 – January 2018
- Worked with **Dr. Hongyuan Zha** on generating visual questions by knowledge guided assistance
- Designed a framework for searching scene graphs of images, then querying an existing knowledge base for n-hop facts, and using TranE embeddings to convert a fact embedding into a question using RNNs

PROJECTS

INTRINSICALLY MOTIVATED CONTEXTUAL BANDITS
- Worked with **Dr.Swati Gupta** and developed in **Tensorflow**
- Posed the problem of exploration in reinforcement learning as a contextual bandits Q-function ensemble, where each bandit was empowered by intrinsic motivation functions such as curiosity to help discover new and improved trajectories for efficient and qualitative search
- Increased the speed of wins by 24% and levels reached from 100 to 770 (over basic UCB) of a Mario agent by 24% on OpenAI Gym

CAPTIONING-VQA | Code | Video
- Worked with **Dr.Devi Parikh** and developed in **PyTorch**
- Created word, image embeddings from pre-trained Image Captioning models to act as context attention for a deep neural Visual Question Answering encoder-decoder framework

INTERPOLO | Code | Poster
- Worked with **Dr.Polo Chau** and developed in **Flask, AJAX, D3.JS and HTML/CSS**
- Interactive Visualisations and Analytics on-demand of worldwide Terrorism between 1970-2016

EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY | MS in Computational Science & Engineering
Specialization: Computer Vision, Deep Reinforcement Learning, Natural Language Processing
August 2017 - May 2019 | College of Computing, Atlanta, GA