

PRADEEP KADUBANDI

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SUMMARY

Aspire to make the world more productive by building technology through research and engineering!. 2 years of Hands-on machine learning and robotics research experience. Seasoned Software Engineer with 13+ years experience at Microsoft & Oracle.

EXPERIENCE

Principal Machine Learning Engineer, Cognitiv.ai *Jan 2021 - Present*

- Cognitiv brings deep learning to programmatic ad bidding.
- Focused on optimization problems for exploiting deep learning models to optimize the ad campaign budget spending.

Research Assistant, RESL @ USC lead by Prof. Gaurav Sukhatme *Jan 2020 - Jan 2021*

- Exploring the question - can we augment trajectory data from a motion planner (expert demonstration) in a setup with access to a low dimensional environment state to achieve sample efficiency in learning a policy from high dimensional image representation of the environment without compromising the quality?
- Acquired experience with applying Deep learning to a robotics problem - implementing a wide variety of network architectures, training, evaluation, distributed training on GPUs, visualizations using matplotlib and tensorboard. Github: <https://github.com/PradeepKadubandi/DemoPlanner>
- Conducted research experiments in 2 different problem settings with preliminary results.
- Preprint research paper can be found at <https://pradeepkadubandi.github.io/publications/>. Expect to submit to a workshop/conference by March.

Research Assistant, ICAROS Lab @ USC lead by Prof. Stefanos Nikolaidis *Jan 2020 - Apr 2020*

- Developed features in wecook (5000 lines, open source c++ project for autonomous cooking) and delivered end to end robot demo using kinova 6-dof jaco arm for research paper submission within a tight deadline of 2 weeks.
- Tasks done - Implemented ROS publisher/subscriber nodes; Worked with rviz and ROS ecosystem tools; Integrated apriltags detections for object identification and localization. Contributions: <https://github.com/icaros-usc/wecook/pull/20>

Research Assistant, NSL @ USC under supervision of Prof. Barath Raghavan *Aug 2019 - Dec 2019*

- Polycultures are growing multiple crops within a farm that support each other and grow together. The key question for the research project is: Can we build an intelligent agent that can learn an effective strategy for growing a polyculture farm? More details can be seen from the ReadMe of the project page: <https://github.com/PradeepKadubandi/Agroecology-Agent> (this is a fork of the lab's private repository).
- After getting the high-level vision and a primer on 3-sisters Polyculture from Prof. Raghavan, I defined the overall execution strategy and breaking the problem into sub-problems.
- Implemented the custom open AI gym environment for experimentation.
- Solved individual subproblems learning an effective spatial structure and an effective temporal structure using a simplified tabular RL setting. More details can be found here: <https://github.com/PradeepKadubandi/Agroecology-Agent/tree/master/ToyProblems>
- The biggest bottleneck is combinatorial action space in addition to state space (compared to a game of Go where action space is still limited though state space is combinatorial) - investigated doing further experiments using ideas from the paper Discrete Sequential Prediction of Continuous Actions for Deep RL.

Senior Software Engineer, Microsoft *Feb 2008 - Aug 2018*

- Led 3-person feature crew to build entity management micro service for Azure Service Bus (a highly scalable distributed messaging service in Microsoft Azure) from scratch.
- Conducted Architectural Design, Work Item break up, prioritization and planning, ensured high quality outcome through design and code reviews for the project. The new micro service handled 3-fold growth of existing production workload.
- Ninja implementer of Custom Store Provider for Durable Task Framework using Service Fabric Reliable Collections (open source) - most complex piece and core pillar of the project. 5000+ new lines of high quality code in the span of two months. Commits: <https://github.com/PradeepKadubandi/durabletask/commits?author=PradeepKadubandi>
- Driven and delivered features in Microsoft ASP.NET and Visual Studio Web Developer Tools across several releases over 5 years . Developed multi-threaded high performing features.
- Shipped features reaching more than a Million developers across the planet .
- Delivered extra features during a high-pressure V1 product cycle building Visual studio tooling for Windows Phone 7 resulting in highest rating and promotion.

Application Developer, Oracle India *Jun 2005 - Jan 2008*

- Built and shipped features, bug fixes in Oracle HRMS product over 2 release cycles.
- Wrote and optimized 100+ Oracle PL/SQL queries/stored procedures that went into ERP products, finished Java 1.5 certification.

PROJECTS

Using Natural Language to augment learning an embedding space for transferable robot skills

- Class project in Deep Learning class at USC. My first project on Deep RL.

- Extending the previous work 'Learning an Embedding space for Transferable Robot skills' by adding a natural language component to guide learning.

Artificial Intelligence for Robotics (Dr. Sebastian Thrun, Udacity)

- Implemented multivariate kalman filters to localize a robot moving in a circular track. Path planning to follow the target and PID control for moving.

Face Detection and Tracking

- Built a face tracker with a webcam sensor to detect and a dynamixel servo to position the camera to align the user's face in the center. Hands-on experience with ROS, cv_bridge, usb_cam.

Data Wrangling and Analysis (Data Science nano degree, Udacity)

- Analyze New York subway Ridership data to infer trends based on weather, time of day, day of week etc. Plotting to visualize the analysis.

EDUCATION

Masters, Computer Science (Intelligent Robotics)

Aug 2018 - Dec 2020

University of Southern California

GPA: 3.97

Bachelor of Technology, Computer Science

Sep 2001 - May 2005

National Institute of Technology Warangal

Percentage: 77.59

SKILLS

Languages: Python, C++, C#, .Net Core, MATLAB

Libraries: Numpy, Pytorch, Tensorflow, Keras, Matplotlib, ggplot, ROS, OpenCV, openai-gym, garage

Fields: Machine Learning, Artificial Intelligence, Robotics, Distributed Systems, deep learning

Sub-Fields: Reinforcement Learning, AutoEncoders, Motion Planning, Optimal Control, Computer Vision, NLP

Tools: Jupyter, Tensorboard, Visdom, MuJoCo, Gazebo, LaTeX, Overleaf

Systems: Azure, Eventhubs / Kafka, MapReduce, Service Fabric, AWS, Kubernetes, Docker

GRADUATE COURSEWORK

- Deep Learning: CNN, RNN, LSTM, GAN, AutoEncoder, VAE network architectures; DQN, TRPO, PPO, Deep RL algorithms.
- Robotics: Probabilistic State Estimation, Localization, (Extended) Kalman Filters, SLAM, Path Planning, Sampling Based Motion Planning (RRT/RRT*), Configuration spaces, Kinematics, Dynamics, and Task Space Regions (TSRs).
- Computer Vision: Traditional Computer Vision methods : Region Segmentation, Image Classification and Detection, Color space, HOG / SIFT features, Structure From Motion, Homography; Deep Learning methods: Various Image Classification architectures (LeNet, VGGNet, AlexNet, InceptionNet, ResNet, EfficientNet), Semantic Segmentation techniques (FCN, DDN, Deep Lab), Object Detection (R-CNN Family, YOLO, SSD, FPN), Instance Segmentation, Activity Recognition.
- Machine Learning: Underlying theory behind classical Machine Learning algorithms. Proofs of Linear/Logistic Regression, SVM and Hidden Markov Models using Lagrangian Duality, Expectation Maximization.
- Autonomous Cyber Physical Systems: Dynamical Systems, Formal methods for safety verification, Temporal and Signal Temporal Logic.
- Coordinated Mobile Robots (Informal Audit of PhD level course): Research literature on configuration spaces, motion planning algorithms, multi robot systems, coverage, behavior based robotics, energy awareness.

ACADEMIC HONORS

- Ranked 2nd in Andhra Pradesh, India (among 100K+ students) and 150 in India wide (among 1 Million students) competitive exams testing Mathematics and Physics.