karthiknarayan

high frequency trader, {machine, deep, reinforcement} learning researcher

contact

+1 (404) 645-4240
karthik.narayan.0@gmail.com

programming

C++, Python, Java, MATLAB

awards

National Defense Science & Engineering Graduate (NDSEG) Fellowship

NSF Graduate Fellowship

Carnegie Mellon ARCS Fellowship (declined)

CRA Outstanding Undergraduate Researcher

NSF MCTP Scholarship ($6,250)

Google BOLD Practicum Scholarship ($10,000)

Georgia Tech President's Undergraduate Research Awardee

scores

GRE-CS: 860/900 (97%)

GRE:
Q: 169/170 (98%),
V: 162/170 (90%),
A: 6.0/6.0 (99%)

education

2012 - 2016 **Ph.D.** in Computer Science — University of California, Berkeley
Advisors: Prof. Pieter Abbeel, Prof. Jitendra Malik. Thesis: Scalable High-Quality 3D Scanning.

2012 - 2016 **Masters** in Computer Science — University of California, Berkeley
Advisors: Prof. Pieter Abbeel, Prof. Jitendra Malik

2008 - 2011 **Bachelors** in Computer Science — Georgia Institute of Technology
GPA: 3.97, Highest Honors. Advisors: Prof. Charles Isbell and Prof. David Roberts. Thesis: Quick Polytope Approximation of Correlated Equilibra in Stochastic Games.

2008 - 2011 **Bachelors** in Discrete Mathematics — Georgia Institute of Technology
GPA: 3.97, Highest Honors. Advisor: Prof. Milena Mihail.

experience

2016 - **Algorithm Developer** — Hudson River Trading, New York, NY
HRT algolabs
Part of a small team responsible for turning moonshot ideas into profitable trading strategies. Created novel signals based on deep learning and remove-liquidity execution strategies based on deep reinforcement learning. Responsible for signal and strategy research, implementation, and deployment. Improved firm-wide PnL by $XX million/yr (simulation and live trading).

2012 - 2016 **Graduate Researcher** — University of California, Berkeley
Berkeley AI Research Lab
NSF Graduate Fellow and NDSEG Fellow at UC Berkeley. Conducted research in robotics, machine learning, and vision. Worked on a series of projects whose goal was to ultimately bring personal robots into households. Specifically, developed novel algorithmic techniques to improve predictive performance of large-scale robot vision systems in cluttered indoor environments.

Fall 2015 **Quantitative Research Analyst Intern** — Citadel LLC, Chicago, IL
Citadel Quantitative Strategies Group
Created and launched the first successful deep learning-based alpha at Citadel as an intern. Generates $XX million/yr PnL. Placed this alpha in production, which involved implementing heavily optimized C++ libraries. Was responsible for all development stages, from research to production implementation.

2012 - 2012 **Software Engineer** — Google, Inc., Mountain View, CA
Google Ads Quality
Developed and implemented large-scale machine learning algorithms to improve Google Mobile Search Ads quality and user experience. Was responsible for projects that currently generate $XX million/yr, from Mobile Search Ads traffic.

2009 - 2011 **Teaching Assistant** — Georgia Institute of Technology
Teaching assistant for the following courses over the course of 7 semesters: CS 1332 (Data Structures and Algorithms), CS 2340 (Objects and Design), CS 3510 (Design and Analysis of Algorithms), CS 4641/7641 (Machine Learning). Designed material for and conducted weekly recitations, typically consisting of 30 - 40 students. Held weekly office hours and graded student assignments.

2008 - 2011 **Undergraduate Researcher** Georgia Institute of Technology
Robotics and Intelligent Machine Center
Primary advisers were Prof. Charles Isbell and Prof. David Roberts. Worked with Prof. Charles Isbell, Prof. David Roberts, Prof. Michael Chapman, Prof. Mark Riedl, Prof. Michael Stilman, and Prof. Milena Mihail, on projects in multi-agent reinforcement learning, natural language generation, ion trapping and laser cooling, computational behavior, robot planning, and network algorithms. Several of these projects have received awards.

2009 - 2010 **Researcher and Course Instructor** Amrita University, Kerala, India
E-Learning Laboratory
Was a researcher and instructor at Amrita University, a charitable university in Kerala, India. As a researcher, developed RIAs featuring 3D collaborative environments and e-learning as part of a team. As a co-instructor for a senior design course focusing on applying 3D RIA development to e-learning, taught students twice a week, created handouts, graded assignments, and answered student questions.

Summer 2011 **Software Engineering Intern** Google, Inc., Mountain View, CA
Google Help
Developed iOS software libraries to handle user feedback; frontend implementation was in Objective-C and backend implementation was in Java. Internationalized all components in 30+ languages. Most Google iOS applications (e.g. Search, Google+, Shopper) now use this library to process user feedback.

Summer 2010 **Software Engineering Intern** Google, Inc., Mountain View, CA
Google Local Search
Implemented inline satellite/terrain map display on Google Search. Internationalized in 30+ languages. For example, try searching for [satellite map of honolulu] on www.google.com or [carte satellite france] on www.google.fr.

Summer 2009 **Research Intern** Cornell University
Laboratory for Elementary Particle Physics
Worked with Prof. Joel Brock, Prof. Georg Hoffstaetter, and Dr. David Sagan to develop algorithms that track photon beam propagation through components of a particle accelerator, namely the Cornell Electron Storage Ring (CESR) and the Energy Recovery Linac (ERL). These algorithms compute mirror placements to control photon beam propagation prior to physical implementation. Was funded by a National Science Foundation (NSF) REU grant.

publications and patents

Optimized Color Models for High-Quality 3D Scanning
Karthik Narayan, Pieter Abbeel :: IROS 2015

Alpha-Beta Divergences Discover Micro and Macro Structures in Data
Karthik Narayan, Ali Punjani, Pieter Abbeel :: ICML 2015

Range Sensor and Silhouette Fusion for High-Quality 3D Scanning
Karthik Narayan, James Sha, Arjun Singh, Pieter Abbeel :: ICRA 2015

BigBIRD: A Large-Scale 3D Database of Object Instances
Arjun Singh, James Sha, **Karthik Narayan**, Pieter Abbeel :: ICRA 2014, RSS-W on RGB-D Perception 2014

Multimodal Blending for High-Accuracy Instance Recognition
Ziang Xie, Arjun Singh, Justin Uang, **Karthik Narayan**, Pieter Abbeel :: IROS 2013

Sparse Combinatorial Autoencoders
Karthik Narayan, Pieter Abbeel :: NIPS-W on Deep Learning 2013

Feature Selection Methods to Boost Performance in Large-Scale Supervised Learning
Karthik Narayan, Matthew Streeter, Dietmar Ebner, Ashish Agarwal, Philip Henderson
Google Patent Application, GP-15528-00-US 2012

Real-time Collaborative Virtual Interactive E-Learning Environment
Kamal Bijlani, Amit Dhar, Jayahari K. R., **Karthik Narayan** :: IEEE IC4E 2011

Quick Polytope Approximation of All Correlated Equilibria in Stochastic Games
Liam MacDermed, **Karthik Narayan**, Charles L. Isbell, Lora Weiss :: AAAI 2011

DEXTOR: Reduced Effort Authoring for Template-Based Natural Language Generation
Karthik Narayan, David L. Roberts, Charles L. Isbell :: AIIDE 2011

ACE: Architecture for Collaborative Environments
Kamal Bijlani, Jayahari K. R., Sreejith K. H., Preeja Pradeep, **Karthik Narayan** :: IEEE ICCSIT 2010

X-Ray Optics in the BMAD Beam Dynamics Computer Code
Karthik Narayan :: Technical Report. Cornell University Laboratory of Elementary Particle Physics 2009