Vinay Rao

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Graduate student of Computer Science seeking engineering and development roles in fast paced teams. Proven track record of delivering creative and end-to-end engineering solutions.

Experience

Robotics and Embedded Systems Laboratory, C.S Dept, University of Southern California May-2015 - current....
Graduate Student Assistant

- System and algorithm development, simulations and backend work for autonomous aerial and aquatic vehicles.
- Currently developing a multi-view adaptable object tracking system for aquatic vehicles.
- Developed in-flight camera simulator for aerial autonomous vehicles.

Data Analytics Laboratory, E.E Dept, University of Southern California May-2015 - August-2015.....
Graduate Student Research Assistant

- Computer vision, statistics and deep learning for medical imaging data (MRI, fMRI).
- Developed a novel deep learning architecture for segmenting tumorous cells in MRI images for BRATS (Brain tumor segmentation challenge) 2015.
- Researched several ways to perform multi-modal learning and stacking to achieve high recall rates for tumor types.

Professional Experience

Aindra Systems, Bangalore, India Jan 2013-Jul 2013.....
Research & Development Engineer, Intern/Consultant

- **Automated attendance system with face recognition and tracking**
  - Led the design and development of an end-to-end cloud based system for attendance automated through computer vision.
  - Designed a scalable architecture for the product that is now used in several places in India.
  - Conducted research, implemented and developed several algorithms including deep networks (LeNet) for face recognition and detection.
  - Single-handedly developed the web-interface for users to interact with the attendance system; it uses their feedback to continuously improve accuracy of the model.
  - Prototyped a face tracking and clustering system using Kalman filters and Gaussian Mixture Models to enable smaller uploads to the server and for industrial use.
- **Biometric face verification system**
  - Leading the on-going development and research of a face verification system for use in industry.
  - Designed and setup the entire architecture required for the product including servers and API design.
  - Conducted training and testing of several state of the art machine learning models such as LeNet (using the deep learning framework, Caffe), Siamese network models etc.
  - Developed ways to increase speed and accuracy of verification by combining several techniques such as ensemble methods with random forests, weighted polling and one-class distributions.
- **Automated detection of cancerous cells through imaging**
  - Built a prototype to detect cancerous cells through image processing.
  - Conducted surveys and talked to field experts to understand and use relevant hand-crafted features for statistical models used in the classifiers.
  - Implemented several image processing algorithms for object localization and pre-processing like blob detection, h-minima etc.
  - Successfully showcased the prototype at Indian Institute of Science, India.

Amazon, Bangalore, India Aug 2013-Jul 2014.....
Software Development Engineer, Platform Development

- **Large scale real-time product and vendor reporting tool**
  - Led a small team in the design and development of a large-scale dynamic reporting tool.
  - Built a system that aggregates data from several different sources on request, and prepares an accessible document for vendor managers.
  - Successful in planning and executing a system that could scale to fetching reports that required billions of requests.
  - Initiated and furthered development to include a web-interface and cloud storage to enable easier access.
  - Reports generated enabled vendor managers to save over 70% of their time to find the same information through workarounds.
- **Easily configurable floating ad banner system for mobile websites**
  - Designed a customizable banner system that is used for displaying floating advertisements on mobile devices.
  - Carried the feature further than initially requested to enable on-the-fly changes by product managers.
  - Project received accolades for creativity and was recognized department-wide for quick deployment.
  - Multiple teams world-wide used this feature and noticed increase in traffic to their channels.
- **Features for Amazon India's retail website**
  - Single-handedly developed and deployed a secure sign-in page for mobile devices.
  - Added several visual and messaging enhancements to product detail pages for PC and Mobile.

- Designed a system to include new filters for search pages in India, including creating data-stores and aggregating information from multiple sources.
- Worked with multiple teams across various locations.
- Appointed as team-lead for mobile website development in India.

Technical skills

- **Programming Languages:** *Proficient in*: C, C++, Python, Java, Matlab/Octave
  Extensively used: JSP, HTML, CSS, Javascript+AJAX, Perl, Php, C#, MySQL, Haskell, Prolog, TeX
- **Frameworks:** ROS (Robot Operating System), Qt, MS Visual, Django, Apache
- **Scientific Libraries:** OpenCV, OpenML, numpy, scipy, nltk, sklearn, Caffe, Theano, pylearn2, boost, liblinear, matplotlib
- **OS & IDEs:** Linux [KDevelop, QtCreator, Eclipse, IntelliJ, Netbeans, Emacs, vim], Windows [Visual Studio], Mac
- **Tools:** git, SVN, MS Office

Academia

- **University of Southern California** — **Los Angeles**
  M S Computer Science (Ongoing), 1st semester GPA:3.6/4.0 — *Aug 2014-May 2016 (tentative)*
  Courses: Advanced Algorithms, Artificial Intelligence, Convex and Combinatorial Optimization
  Probabilistic Reasoning, Brain Theory and Artificial Intelligence
- **Visvesvarayya Technological University** — **Bangalore**
  B S Computer Science, GPA: 8.78/10.0 — *2009–2013*
  Courses: Pattern Recognition, Probability & Statistics, Advanced data structures and algorithms, Networks, OS, Compilers

External Courses

Coursera:

- Machine Learning by Andrew Ng: Regression, Neural networks, designing machine learning systems
- Neural Networks by Geoffrey Hinton: Recursive neural networks, Bayesian learning, Hopfield networks, Autoencoders, Pretraining
- Statistical Inference by Brian Caffo: statistical modelling, data oriented strategies, explicit uses of designs and randomizations in analyses.

Notable Projects

- **Convex and Combinatorial Optimization (Master's project):** *'On the optimization techniques in high-dimensional clustering, dimensionality reduction and visualization'* Instructor: Shaddin Dughmi
  - Surveyed state of the art algorithms for unsupervised learning such as Stochastic Neighbor Embedding and Spectral Clustering and compared their results in the domains of clustering and visualization.
  - Unified their results as a random Markov walk, and presented their optimization techniques.
  - Pointed out research that has spawned from these general ideas and also proposed improvements to algorithms and optimization techniques used in the papers.
- **Pattern Recognition (Bachelor's Thesis):** *'A holistic view on object recognition'*
  - Led a team of 4 to conduct a comprehensive survey and study of historic to state of the art algorithms and features for generic object recognition.
  - Implemented several algorithms including multinomial regression, Linear SVMs, and some feature extractors.
  - Presented comparitive results of recognition with hand-crafted (SURF/SIFT) features vs convolutional networks with deep learning (automated feature extraction).
  - Applied some of the faster algorithms to perform real-time object recognition and localization in videos.
  - Was recognized as one of the best projects in the department. The whole team was invited back after graduation to talk about this project.

Relevant activities and achievements

- **Google Summer of Code 2012:** *Contract Developer under Google for Gluon, KDE: Generic persistence system for a game engine*
  - Developed a system that completely eliminates the need for game creators to worry about game state persistence.
  - Game states are saved as Gnu Data Language (GDL) files by passing states/objects between Javascript and C++ layers.
  - Took initiative to develop a scene-graph system with tags that quickens development.
  - Successfully completed work on incremental save/loads that reduced file sizes up to 80%.
- **Other Projects**
  - *Summer of KDE 2011*: Designed a simple compiler in Python that converts UI configurations (XML) to Python code.
  - Implemented several machine learning algorithms and used them successfully for problems on Kaggle, Hackerrank and Topcoder
  - Designed and trained several systems for face recognition, object detection, etc using architectures such as LeNet.
- **Activities & Achievements**
  - Avid member of open source communities such as opencv, KDE, scipy etc
  - Organized Software Freedom Day and technical seminars during undergraduate studies.
  - Actively part of various activities of BMS-Libre Users Group.
  - Won several inter-collegiate coding competitions and participated in hackathons that resulted in internship offers.