

Vinay Rao

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Professional Experience

Baidu Research Mountain View, CA Jan 2016-current.....

Software Engineer in Artificial Intelligence

- o System development for deep learning architectures applied to speech recognition.
- o Research and develop novel architectures and algorithms for automatic speech recognition.

Aindra Systems, Bangalore, India Jan 2013-Jul 2013.....

Research & Development Engineer, Intern/Consultant

- o **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.
- o **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.
- o **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

- o **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.
- o **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.
- o **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.

Research Experience

Robotics and Embedded Systems Laboratory, C.S Dept, University of Southern California May-2015 - Dec 2015.

Graduate Student Assistant

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

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

Technical skills

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

Academia

- o **University of Southern California** **Los Angeles**
M S Computer Science, GPA:3.6/4.0 *Aug 2014-December 2015*
Courses: Advanced Algorithms, Artificial Intelligence, Convex and Combinatorial Optimization
Probabilistic Reasoning, Brain Theory and Artificial Intelligence, Computer Vision
- o **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:

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

Notable Projects.....

- o **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.
- o **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 comparative 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.

Relevant activities and achievements

- o **Projects**
 - *Google Summer of Code 2012:* Developed a generic persistence system for Gluon, a game engine under KDE.
 - *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.
- o **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.