Anil Kumar Mullapudi

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Summary:

- Computer science engineer specialized in machine learning for robotics, with 5 years of experience in software design and development
- Developed machine learning algorithms using MATLAB and Python scikit-learn.
- Worked on PR2 robot using Robot Operating System (ROS) framework for Human Computer Interaction (HCI) applications.
- Explored GPGPU to boost up performance of Hidden Markov Models(HMM) for activity detection.
- Experienced in on agile methodologies and waterfall model for software development processes.
- Experience in client design and validations using HTML, Java Script, AJAX, JSP, and jQuery.
- Expertise in web application development using Struts, Spring Framework, Spring MVC, Spring IOC Container, Oracle PL/SQL.

Skills:

- **Programming Languages:** Java, Python, C++, C#, MATLAB, SQL, JavaScript, XML, HTML.
- **Databases:** Oracle, MySQL
- **Machine Learning Libraries:** Scikit-learn, numpy, and matplotlib.
- **Other Tools and Technologies:** Web Services, Struts, Spring, Robot Operating System (ROS), Linux, Git, Eclipse, Visual Studio.

Employment:

Research Assistant   University of Texas at Arlington Research Institute   June 2016 – Dec 2016

- Worked on PR2 robot state machine for pick and place tasks scenarios.
- Created a human behavior detector for identifying behaviors such as, when user is lying on bed, sitting, and standing.
- Worked on face emulator for PR2 robot.

Teaching Assistant   University of Texas at Arlington   Sep 2015 - May 2016

- Assisted the professor for Design and Analysis of Algorithms Course and Lab.
- Had office hours during which my job was to clarify all the doubts faced by the students in the course.

Analyst   Verizon Data Services India Pvt. Ltd   May 2012 – Dec 2014

- Worked on prototype to generate business processes using model-driven architecture.
- Worked on web applications for Verizon customer service portals. Developed features to update the customers with the new data plans currently available, and their data & call usage statistics.
- Worked in architecture team and developed proof of concepts for teams using SOA (Service Oriented Architecture), Apache Velocity Templates, springs, and Java Script.

IT Engineer   Hewlett-Packard Global Soft Limited   Oct 2010 – May 2012

- Provided enhancements based on business requirements, maintained and supported HP internal applications which involves product life cycle management, using Java based frameworks, and XML.
- Developed code to create new parts in windchill tool using python.

Trainee Software Engineer   Intense Technologies   Nov 2009 - Sep 2010

- Worked in web application development which involves developing code for query builder using Struts, Html, Oracle, and Java Script.
- Developed code to generate reports and export in various formats such pdf and excel.

CERTIFICATIONS

- Oracle certified java professional (OCJP) with 93%.
- Machine learning. (from Coursera.org)

ACADEMIC & OTHER PROJECTS

Activity Detection and Classification on a Smart Floor PDF
An approach to activity detection and classification aimed at smart floor data is developed and evaluated. The activities standing, walking, and other activities are identified within the data from pressure sensors which are mounted under the floor. To identify activities, the Logistic Regression and Hidden Markov Models (HMM) are used.

- The idea is to use Hierarchical Hidden Markov Model(HHMM) for learning for classification, but the forward probability calculation in HHMM takes $O(NT^3)$ Where N is the number of hidden states and T is the length of observation sequence. Since cubic time is not feasible to compute with the increase of hidden states and observation sequence length, a flat HMM is developed by modifying Baum-Welch algorithm which takes $O(NT^2)$ to compute forward probability.
- Eliminated the noise in the unloaded sensors by performing floor calibration.
- Various features extracted from the pressure sensors data such as center of pressure, speed, and average pressure are used for the detection and classification.
- Extracted features are translated into frequency components using a multidimensional fast Fourier transform(FFT) algorithm. 76 dimensional features are reduced to three dimensions with the help of Logistic Regression.
- Manually labeled the data in MATLAB, and HMM models are used to capture longer-term relations in activities and to more precisely capture the points where transitions between activities occur. To build the HMM, presented the variations of the Baum Welch algorithm for partially and semi-supervised applications.
- The proposed HMM model is achieved 89% classification accuracy and the accuracy is increased to 95% with the semi-supervised learning approach.
- The computations are performed in logs and ran on four cores of CPU in parallel to reduce the training time. However, the class labelling is still manual, this can be automated to reduce the human efforts.

HTKS Game using Nao Robot for Children
Worked on Nao robot and implemented HTKS game to improve children executive functions using python API.

- In HTKS game children will be instructed to touch either their head, knees, toes or shoulder by imitating the actions performed by the NAO Robot.
- Implemented the actions and movements of NAO robot using Choregraphe tool and python API of NAO robot.
- A user interface developed to interact with robot using .Net framework.
- The Kinect 2.0 camera is used to evaluate the children actions during the game. But not able to evaluate the few actions due to occlusion problems. When children touch their feet, not able determine the angles between joints using kinect api's available in Unity software. May be a better machine learning training is required to solve this problem.

Unmanned Vehicle Systems
Built an autonomous ground vehicle(Rover) capable of accomplishing waypoint navigation, obstacle detection and avoidance, and path planning.

- Designed and assembled the Rover, attached Pixhawk flight controller and Global Positioning System (GPS) receiver for waypoint navigation using a mission planner.
- Implemented the Guidance, Navigation, and Control (GNC) algorithm that we learned in the Introduction to Unmanned Vehicle Systems course.
- Manhattan Distance path planning algorithm for navigation with the obstacle avoidance capabilities.
- Tuning the parameter of KP and KI values of a closed loop PID controller is painful and not able to tune accurately. As a result, the Rover left and right turns are not symmetrical.

Media Control Using Gestures Detection
Implemented Gesture detection system(GDS) using Microsoft Kinect V2, and the GDS helps to issue commands to control media (E.g. Video) using gestures.

- The GDS detects Commands like Play, Pause, Stop, and Volume Control by using the Skeleton Model of the Kinect.
- User interface for GDS is developed using C# and Visual studio.