Varsha Kirani Gopinath

Curriculum Vitae

"All that we are is the result of what we have thought." – Buddha

Info

Born June 4th, 1991 at Sira,Tumkur (India)

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Education

2014 - present **Master of Science in Machine Learning**, *KTH Royal Institute Of Technology*, Stockholm, Sweden.

2 year programme, majoring in Machine Learning and Computer Vision. Other important courses include: Artificial Neural Networks, Artificial Intelligence and Information Retrieval.

2010 - 2013 **Bachelor of Science in Computer Science Engineering**, *M.S.Ramaiah Institute Of Technology*, Bangalore, India.

4 year programme majoring in algorithms, computer architectures and basics of programming languages and platforms. Other courses included part of this program were Graphics and Visualisation, Discrete Mathematics, Database Systems and Operating Systems

Technical Skills

Languages C++, JAVA, PYTHON, SQL, MySQL, SQLITE Latex, Javascript, HTML5, CSS3, Jquery, C, C#

Tools Matlab, OpenGL, Visual Studio, Eclipse IDE, Netbeans IDE

Recent Coursework

- Artificial Intelligence
- Machine Learning-Advanced
- Artificial Neural Network
- Search Engine and Information Retrieval
- Applied Bioinformatics
- Image Based Recognition and Classification (May 2015)
- Visualisation (May 2015)

Projects and Abstracts

Hidden Markov Model based Video Game Agent for Duck Hunt

Artificial Intelligence

The agent playing the game is required to *shoot* birds of different species flying in the sky in characteristic patterns. This entailed to build an agent that trained HMMs and used them to predict the next move of the birds and classify them based on its species. I implemented the Baum-Welch Algorithm for training HMMs and used the forward algorithm for classification and prediction. (1 member team)

Improving Elevator Performance Using Reinforcement Learning

Machine Learning

The challenge was to learn an optimum elevator operation policy from experience, in order to reduce the travel overhead and improve passenger service. We constructed an Artificial Neural Network to learn a map from the passenger demand scenario to the action sequence an elevator must take. Different events in the simulation were in continuous time space. Because of huge branching factor, instead of look-up table, Q learning and neural networks were used to learn the system (conventionally state transition probabilities will be maintained). The Q-learning will back-propagate the error into the neural network to update the weights.Total waiting time of the passenger is reinforcement signal. Whenever an event occurs, reinforcement signal is used in Q-learning. We also, simulated an elevator-calling system including a visualisation. (5 member team)

Classifying Proteins based on Signal Peptides using Hidden Markov Models

Applied Bioinformatics

Signal peptides are vital for many cell functionalities. Our technique was built to classify all the proteins as containing such signal peptides or not, based on their sequence of molecular structures. Real world data was from *Ensembl's BioMart* service. During training, each protein is modelled into a Hidden Markov Model(HMM) and labelled according to the presence/absence of signal peptides. The new unseen protein is classified using *Forward Algorithm*. I also used BioPython to extract the data into required format. (1 member team)

Comparison of Different Methods for Search Engines

Search Engine and Information Retrieval

For *DavisWiki* corpus, a search engine was built where one can search for documents which has main searching facilities like intersection query, phrase query, tf-idf ranked retrieval , page rank retrieval and combination of any two. The main intention was to play around and learn different methods in search engine and information retrieval. (1 member team)

Natural Language Generator for Wardrobe Tips depending on Weather

Artificial Intelligence

We used context free grammar (CFG) and a large raw corpus to build parse-trees which were then organised into tree-banks. Such tree-banks could then be used as probabilistic CFG (PCFG). Different generators (Greedy, Viterbi, n-gram) tapped the PCFG conditionally and produced sentences or phrases as wardrobe tips. Evaluation of the application was done using cross validation method where *string-edit* and *BLEU methods* are used. A human survey was also made to serve as an informal Turing-Test. (4 member team)

Artificial Neural Network to Solve Travelling Salesmen Problem

Artificial Neural Network

The challenge was to find the shortest path to travel through the given number of cities. This was solved using *Self Organizing Maps* (SOM) which is a type of artificial neural networks. SOM algorithm was analyzed for various values of parameters, like neuron number, epochs, learning rate etc. (2 member team)

Train systems using JAVA and SQL

Programming

A simple application of train system where both passengers and admin were able to get information about the trains like arrival time, departure time,complete route map and other info were made available. The main intention of the project was to explore JAVA functionalities and Database Management Systems.(2 member team)

Jumble Mumble, the word game in C#

Programming

It is a simple word game where user is given jumbled letters and asked to form multiple words. Scores were given according to length of the word and also weights on each alphabet. The whole application was done using C# and .Net assemblies using Visual Studio.(2 member team)

Building Node Intelligence in MANETs for Efficient Routing

Bachelor Thesis

As single protocol will not serve all the purposes required for communication in MANETs, switching between protocols can resolve this problem but builds up an overhead in the network as it need an external agent to monitor the environment and dictate to the network on which protocol should be chosen. Thus,the nodes present in the network can be made intelligent enough to sense its environment and select the suitable protocol ,that is , the switching can be done at the node level itself so as to reduce the overhead in the network and to make the routing more efficient. For real time scenarios and simulations we used NS2.35 simulator. AODV and DSDV protocols are considered. Node density and the pause time of the environment are taken as the cost metrics. At the learning phase, we learn about protocol which better fits at different scenarios. According to this result switching is done at node level to chose the protocol.(4 member team)

Publications

Building Node Intelligence in MANETs for Efficient Routing

year–year

degree or job title, *institution or employer*, city, grade.
description

Industry Experiences

Work

2013–2014

Associate Software Developer, *SAP Labs India*, Visualization Recommendation Team, Bangalore.

I worked in the *Business Intelligence Team* at SAP Labs, India - contributing to the development of *Lumira*. *Lumira* is a data analysis tool which provides efficient visualisations of large data focussed on businesses and economics. The main scientific challenge was to recommend the best visualisations depending on the data provided. I learnt to code in the Model-View-Controller software pattern of coding. Working in a corporate environment has also improved my teamwork skills and discussion-for-consensus capabilities.

Internship

Feb 2013 - Jun 2013

ABAP-Language programmer, *SAP Labs, India*, Team- Student Life Cycle Management, Bangalore.

I worked on a database product for Student-Life-Cycle-Management. Vital technical challenges were the understanding of the workflow of the entire product and growing agility in using Advanced Business Application Programming (ABAP) language.

Interests and Hobbies

I love any sport but I prefer Badminton and Table Tennis. I love social gathering and interested in spending time with people more. Love gaming and a big time gay NARUTO fan.