Ramkumar Rajendran

29, P.R.H Road, Lakshmipuram, Chennai 600099
+91 9769535838 ramkumar.r@iitb.ac.in

EDUCATION

- **Doctor of Philosophy** — **Expected on Aug 2013**
  IITB-Monash Research Academy (CGPA: 8.52/10)
  IIT Bombay, India and Monash University, Australia [1]

- **Master of Engineering** — **Aug 2004 - June 2006**
  Communication Systems (84% with Distinction)
  Anna University, Chennai, India

- **Bachelor of Engineering** — **July 2001 - June 2004**
  Electronics and Communication Engineering (77% with Distinction)
  University of Madras, Chennai, India

AREAS OF RESEARCH EXPERTISE

Learning Analytics, Educational Data Mining, Applied Machine Learning, Affective Computing, Intelligent Tutoring System. (Demonstrated by course credits and publications)

ACADEMIC RESEARCH

PhD Thesis Title: Enriching Student Model in an Intelligent Tutoring System.

Advisors: Dr. Sridhar Iyer (IITB), Dr. Sahana Murthy (IITB), Dr. Campbell Wilson (Monash), and Dr. Judithe Sheard (Monash).

Description: An Intelligent Tutoring System (ITS) is a computer based self-learning system which provides personalized learning content to students based on their needs and preferences. An ITS consists of learning content, student model and adaptation engine. To adapt the learning content based on affective states, students' affective states should be identified while they interact with the ITS. In our research we focus on data-mining approaches to identify frustration in an ITS. We proposed and developed a novel frustration model which identifies students' frustration in real-time, while they interact with the system. We operationalized the theoretical definitions, to construct features from ITS log data, and developed a linear regression model using the features to identify frustration. The learned

[1] Dept of CSE at IITB and Faculty of IT at Monash University

model helped us to understand not only causes of frustration but also the contribution of each features towards frustration. Once frustration has been identified by our model, we address the issue of frustration by providing motivational messages based on cause of frustration. We applied the constructed features to polynomial regression classifier and different classifiers in weka to compare our model with existing methods. Our model predictions are comparable with existing methods and also provides the informed adaptation (addressing the cause).

Development Environment: Matlab, Weka, Java.

M.E Thesis Title: Automatic Classification of Brain Tumors in MR Images using Least Square Support Vector Machine.
Advisors: Dr. D Selvathi, Mepco Schlenk Engg College, TamilNadu, India
Description: The manual interpretation of MRI slices based on visual examination by radiologist/physician may lead to incorrect diagnosis when a large number of MRIs are analyzed. Hence we developed an automatic method to classify brain tumors in MR images. In our work, a group of patients with four brain abnormalities are considered. We used LS-SVM based approach with nonlinear type of kernel for the automated classification of brain abnormality in MRI data. This is done in two class classifications and multi class classifications. The categorization of patients into normal and abnormal is done using statistical features of images such as mean, variance, and co-occurrence based textural features of images such as energy, entropy. Again the abnormal patients are classified for different type of tumors. For comparative analysis, Radial Basis Function, Multi Layer Perceptron and K-Nearest Neighbor classifiers are also implemented. In intelligent computer aided health care system, our classifier using LS-SVM can be used to assist the physician for accurate diagnosis.

Development Environment: Matlab, SVM-Light, cSVM.

PUBLICATIONS

Manuscripts in Preparation (or submitted)

- A Theory-Driven Approach to Predict Frustration in an ITS, *Ramkumar Rajendran, Sridhar Iyer, Sahana Murthy, Campbell Wilson, and Judithe Sheard*, IEEE Transactions on Learning Technologies, Submitted on Jan 2013.

Papers in Refereed Journals

- Support Vector Machine Based Automatic Classification of Human Brain using MR Image Feature, *Henry Selvaraj, Thamarai Selvi, D Selvathi, and R Ramkumar*, International Journal of Computational Intelligence and Applications, Vol 6(3), Pages 357-370, 2006.

- Least squares support vector machine based classification of abnormalities in brain MR images, *ST Selvi, D Selvathi, H Selvaraj, and R Ramkumar*, Journal of Systems Science - Wroclaw, Vol 32(1), Pages 89-103, 2006.

Papers in Conference Proceedings

- Literature Driven Method for Modeling Frustration in an ITS, *Ramkumar Rajendran, Sridhar Iyer, and Sahana Murthy*, ICALT, 2012, Rome, Italy.
- Automatic identification of affective states using student log data in ITS, *Ramkumar Rajendran*, Doctoral Consortium in AIED, 2011, Auckland, New Zealand.

Symposium

- Enriching the student model in Intelligent Tutoring System, *Ramkumar Rajendran*, Doctoral Symposium in Melbourne Computing Education Conventicle, Nov 2011, Swinburne Hawthorn Campus, Melbourne, Australia.
- Automatic Identification of Affective States in ITS, *Ramkumar Rajendran*, Poster Presentation at IITB-Monash Research Academy's Annual Symposium, Feb 2011, Mumbai, India.

WORK EXPERIENCE

- **Tata Consultancy Services, Chennai** (September 2006 - December 2008)
  Position: Assistant System Engineer

  - Associated with **customer information system development** project for **Bank of America**. (May 2007 -Dec 2008)

  - Associated with **Lehman Brothers outsourcing** project for **Lehman Brothers**. (Dec 2006 - April 2007)

ACHIEVEMENTS

1. **Guinness Book** and **Limca Book** record for the most number of people who solved **Rubik's cube** at the same time in 2012.
2. **Client Appreciation** for handling **CostSaving project** A development project for cost reduction by optimizing the journal process for **Bank of America's California on-line Customer's Database**.
3. **IBM Certified Database Associate**.
4. **NCFM certification** for financial markets- A beginners module.

REFEREES

Dr. Sridhar Iyer
Associate Professor
Dept. of Computer Science & Engineering, IIT Bombay
Email: sri@iitb.ac.in
URL: `http://www.cse.iitb.ac.in/~sri/`

Dr. Sahana Murthy
Assistant Professor
IDP in Educational Technology, IIT Bombay
Email: sahanamurthy@iitb.ac.in
URL: `http://www.it.iitb.ac.in/~sahanamurthy/`

Dr. Campbell Wilson
Senior Lecturer
Faculty of IT, Monash University
Email: campbell.wilson@monash.edu

Dr. Judithe Sheard
Associate Professor
Head - Caulfield School of IT
Faculty of IT, Monash University
Email: judy.sheard@monash.edu
URL: `http://www.csse.monash.edu.au/~jsheard/`