

BARNAN DAS

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CAREER OBJECTIVE

To be involved in research and product development activities in the area of machine learning and its applications.

RESEARCH INTEREST

My research interests are in the areas of **machine learning** and **data mining** with applications in various real-life learning problems. My current work involves addressing machine learning challenges in pervasive healthcare.

EDUCATION

Doctoral Program (PhD), Computer Science **Fall 2009-Summer 2013(Expected)**
Washington State University, Pullman WA **GPA: 3.81/4.00**
Thesis Title: *Addressing Machine Learning Challenges to Perform Automated Prompting*
Advisor: Dr. Diane J. Cook

Bachelor of Technology, Computer Science and Engineering **2005-2009**
West Bengal University of Technology, Kolkata, India **GPA: 4.00/4.00**

PROFESSIONAL EXPERIENCE

Research Assistant **Summer 2010-Present**
Washington State University

- Designed and implemented machine learning algorithms on smart home sensor data to address classification challenges.
- Conducted experiments to collect daily activity data of human subjects from smart home sensor suite.
- Developed Android app to collect locomotive activity data from smart phone-based sensors.
- Developed prompting interface (phone and tablet) for older adults to deliver audio/video prompts in smart homes.

Teaching Assistant **Fall 2009 – Spring 2010**
Washington State University

- Courses: Advanced Data Structures (Sophomore) and Formal Language and Automata Theory (Junior).
- Graded programming assignments and homework, conducted in-class problem solving sessions with students.

RESEARCH PROJECTS

- **Learning from Class Imbalanced Data** (2011-2012): Handling classification scenario with highly skewed class labels. Designed and implemented two novel Gibbs sampling based minority class oversampling algorithms that improved true positive rate of common classification algorithms by 58% over other existing oversampling techniques used to preprocess datasets with skewed class labels.
- **Learning from Overlapping Classes Data** (2011): Classification of ambiguous regions in data space where prior probabilities of samples from two/more classes is approximately equal. Designed and implemented a novel clustering-based under-sampling algorithm that improved true positive rate of common classification algorithms by 132% over other techniques used to preprocess datasets with overlapping classes.
- **Activity Recognition from Presegmented Sensor Data Sequence** (2010): Classification of pre-segmented smart home sensor data sequences using Hidden Markov Model and Conditional Random Fields to recognize activities of daily living.

ENGINEERING PROJECTS

- **Automated Essay Scoring** (2012): Developed an automated essay grader using Natural Language Processing (NLP) algorithms to predict scores for K-12 student essays which achieved 68.5% prediction accuracy on 20,000 anonymous essays provided by Hewlett-Packard Foundation. *Java, Weka, NLP APIs*

- **Prompting Interface for Smart Homes** (2012): Android app for phone and tablet to deliver audio/video prompts to older adults in smart homes. Used XMPP (Jabber) client Smack API to connect to XMPP server that receives command for prompt delivery. **Android SDK**
- **In-Home Location Estimation** (2012): Exploratory project on the potential of magnetic field data from smart phones to recognize indoor locations. Achieved 98.5% classification accuracy using machine learning algorithms such as decision tree and support vector machines. **Android SDK, Weka, MATLAB**
- **Locomotive Activity Recognition on Smart Phones** (2010-2011): Android app to perform real-time classification of locomotive activities (walking, running, etc.) using tri-axial accelerometer on smart phones. **Android SDK, Weka**

PUBLICATIONS

Book Chapters

- **B. Das**, N. C. Krishnan, D. J. Cook, “*Handling Imbalanced and Overlapping Classes in Smart Environments Prompting Dataset*”, Springer Book on Data Mining for Services in **Studies in Computational Intelligence**, 2012.
- **B. Das**, N. C. Krishnan, D. J. Cook, “*Automated Activity Interventions to Assist with Activities of Daily Living*”, IOS Press Book on Agent-Based Approaches to Ambient Intelligence, 2012.

Journal Articles

- **B. Das**, N. C. Krishnan, D. J. Cook, “*RACOG and wRACOG: Two Gibbs-Sampling Based Oversampling Techniques*”, submitted to **IEEE Transaction in Knowledge and Data Engineering (TKDE)**, 2013.
- **B. Das**, D. J. Cook, M. Schmitter-Edgecombe, A. M. Seelye, “*PUCK: An Automated Prompting System for Smart Environments*”, **Journal of Personal and Ubiquitous Computing**, 2012.
- A. M. Seelye, M. Schmitter-Edgecombe, **B. Das**, D. J. Cook, “*Application of Cognitive Rehabilitation Theory to the Development of Smart Prompting Technologies*”, **IEEE Reviews on Biomedical Engineering**, 2012.

Conferences

- S. Dernbach, **B. Das**, N. C. Krishnan, B. L. Thomas, D. J. Cook, “*Simple and Complex Activity Recognition Through Smart Phones*”, International Conference on Intelligent Environments (**IE**), 2012.
- T. Pal, H. Banka, P. Mitra, **B. Das**, “*Linguistic Knowledge Based Supervised Key Phrase Extraction*”, National Conference on Future Trends in Information, Communication Technology & Applications, India, 2011.
- **B. Das**, C. Chen, A. M. Seelye, D. J. Cook, “*An Automated Prompting System for Smart Environments*”, International Conference on Smart Homes and Health Telematics (**ICOST**), 2011.
- E. Nazerfard, **B. Das**, D. J. Cook, L. B. Holder, “*Conditional Random Fields for Activity Recognition in Smart Environments*”, International Symposium on Human Informatics (**SIGHIT**), 2010.
- C. Chen, **B. Das**, D. J. Cook, “*A Data Mining Framework for Activity Recognition in Smart Environments*”, International Conference on Intelligent Environments (**IE**), 2010.

Workshops and Demos

- **B. Das**, B. L. Thomas, A. M. Seelye, D. J. Cook, L. B. Holder, M. Schmitter-Edgecombe, “*Context-Aware Prompting From Your Smart Phone*”, Consumer Communication and Networking Conference Demonstration (**CCNC**), 2012.
- **B. Das**, A. M. Seelye, B. L. Thomas, D.J. Cook, L. B. Holder, M. Schmitter-Edgecombe, “*Using Smart Phones for Context-Aware Prompting in Smart Environments*”, CCNC Workshop on Consumer eHealth Platforms, Services and Applications (**CeHPSA**), 2012.
- **B. Das**, D. J. Cook, “*Data Mining Challenges in Automated Prompting Systems*”, **IUI** Workshop on Interaction with Smart Objects Workshop (**InterSO**), 2011.
- **B. Das**, C. Chen, N. Dasgupta, D. J. Cook, “*Automated Prompting in a Smart Home Environment*”, **ICDM** Workshop on Data Mining for Service, 2010.
- C. Chen, **B. Das**, D. J. Cook, “*Energy Prediction Using Resident’s Activity*”, KDD Workshop on Knowledge Discovery from Sensor Data (**SensorKDD**), 2010,
- C. Chen, **B. Das**, D. J. Cook, “*Energy Prediction in Smart Environments*”, **IE** Workshop on Artificial Intelligence Techniques for Ambient Intelligence (**AITAmI**), 2010.

TECHNICAL SKILLS

Languages: Java, Python, C, HTML, CSS, Bash shell, SQL

Machine Learning Tools: Weka, MATLAB/Octave, LIBSVM, Rapid Miner, Orange, MALLET

Mobile Platform: Android SDK

Database: Oracle SQL 9i

Other Software: Eclipse, MS Visual Studio, Adobe Dreamweaver, MS Visio

Operating System: Linux, Windows

PROFESSIONAL ACTIVITIES

Reviewer:

- Pervasive and Mobile Computing Journal (2012, 2011)
- International Conference on Distributed Computing Systems (2012)
- IOS Press Book on Agents and Ambient Intelligence (2011)
- International Conference on Tools in Artificial Intelligence (2010)

Member: AAAI, IEEE, SIGKDD, SIAM

Founding Member and Elected Vice President: Society for EECS Graduate Students (departmental graduate student body)

Elected Senator: Graduate and Professional Students Association, WSU (university-wide graduate student body)

AWARD

- Highly Commended Paper Award for Locomotive Activity Recognition project out of 75 accepted papers at The 8th International Conference in Intelligent Environments 2012.

REFERENCES

- **Dr. Diane J. Cook** (PhD Advisor)
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