CONTACT INFORMATION	Graduate Student University of Massachusetts Amherst, USA	*mobile:* +1-(413) 404-7791 *E-mail:*bgullapalli@cs.umass.edu bhanutejaiit@gmail.com

RESEARCH INTERESTS

Machine Learning, Wearable Health Sensing, Ubiquitous computing

EDUCATION

Ph.D. in Computer Science,   Sep'18 - Present
University of Massachusetts, Amherst, USA

Masters in Computer Science,   Jan'17 - Sep'18
University of Massachusetts, Amherst, USA   CGPA-3.95/4.0

Bachelor of Technology in Computer Science,   Jun'11 - May'15
Indian Institute of Technology(IIT), Guwahati, India   CPI-7.81/10

RESEARCH PROJECTS

Detecting Opioid administration using physiological signals   Jul'19 - Present

Guide:Tauhidur Rahman Dept. of Computer Sciences UMass, Stephanie P. Carreiro UMass Medical school

In this work, we detect the administration of different types of opioids given IV using physiological signals obtained from the E4 smartwatch. We model opioid administration by extracting features from time-series signals and using a BiLSTM based model. We devised a hybrid loss function that can help detect the time-window where an opioid might have been administered as well as the exact moment of administration in that window. Finally, a quantitative analysis of the predictions of the model suggests and supports various medical findings.

Understanding Addiction loop for Cocaine   Feb'18 - Feb'19

Guide:Tauhidur Rahman, Deepak Ganesan Dept. of Computer Sciences, UMass

This work focuses on understanding multiple variables of the addiction loop to develop Just-in-time interventions. We model Cocaine craving, euphoria and drug-seeking behavior using cardiac and respiratory signal obtained from a wearable chest band in subjects addicted to the drug. We analyze various aspects of ECG and Breathing signal which made it possible and observe how it is different for different variables. We also show how knowing the target user's personal information can benefit our system performance. Finally, Drug-seeking behavior is mainly understood in animals, we are the first ones who looked into this in humans and we show that it is indeed possible to detect this using cardiac and respiratory signals.

Growing Tree-Structured Detector Cascade   May'17 - Aug'17

Guide:Benjamin M. Marlin, Dept. of Computer Sciences, UMass

Developed a novel way to grow and find the optimal configuration of a tree structured cascade using the idea of neutral predictor. Tested on Mobile Health dataset, this method increased the accuracy and F1-Score significantly. Brought down the computational complexity from exponential to linear.

Community Detection Algorithms   May'13 - Jul'14
Guide:Saswata Shannigrahi , Dept. of CSE, IIT Guwahati
Comparative study of behavioral based vs structural based community detection
methods using goodness metrics- modularity and like-mindedness was performed.
Then introduced two new algorithms- modified louvain method and like-mindedness
maximization. Unlike louvain method, modified louvain increases both modularity
and like-mindedness. Like-mindedness maximization is bottom-up hierarchical clus-
tering approach which maximizes like-mindedness metric by discouraging the merging
of big communities.

Custom Font Generation   Aug'14 - May'15
Guide:Benny George, Samit Bhattacharya Dept. of CSE, IIT Guwahati
Font generation for user using geometrical properties of a curve. First, given input
is interpolated into B-splines. Then we created a function between spline curves and
characters. By using the input splines and function, generated all possible characters.

KEY ACADEMIC PROJECTS

Drug Target prediction using Deep Representation Learning *Jan'18-Present*

- Traditional methods had involved using naive representations for drugs and
  proteins which resulted in a low performance and the results were very hard to
  interpret.
- Using the idea of Graph convolution to represent the drugs, as they are more
  interpretable and stable. Protein sequence will be converted to a smaller vector
  representation using an LSTM, similar to word embeddings. The hypothesis is
  better representation guarantees better results.
- Finally, Using Attention Mechanism to better interpret the results i.e. which
  part of the protein interacts which part of the drug structure.

**Improving the practical effectiveness of a best arm algorithm and extend-
ing it to top K arm in stochastic multi-armed bandit**   *Oct'17-Dec'17*

- Exponential gap , a best prediction algorithm guarantees good theoretical bounds
  but fails miserably in practical situations.
- By improving the elimination criteria, made it practically effective against cur-
  rent state-of-art best arm algorithms.
- This algorithm is then extended to Top K arm selection by changing the sam-
  pling rate. The sample complexity of this modified algorithm is better than the
  current state-of-art Top K arm selection algorithms.

Extending Learning-to-Optimize   *Oct'17-Dec'17*

- In this project we look at the work done in trying to eliminate the hyperparam-
  eter tuning of optimization algorithms. We model this as a learning problem
  and train an RNN which takes gradient information as input to predict the
  update step of parameters. We investigate which parts of the model architec-
  ture play an important role in generalizing to different problems. We perform
  experiments using the MNIST dataset using different variants of the model
  architecture and present the performance results.
- Removing the hyperparameters in optimization algorithms of neural networks
  by trying to learn these hyperparameters at each step of the iteration.

- Using RNN whose input is the optimization algorithm's input, by inputting this RNN with all current standard optimization algorithm's input together with a goal to learn over these depending on the current position in function space.

Tags prediction for Stack Overflow questions using linear CRF   *Mar'17-May'17*

- Using the idea of cascading, initial predicted tags are used as features for later predictions.
- Information present in body of post and code information if provided are treated differently. These two changes gave the best accuracy so far present on this dataset.
- Features considered here include user details, question information, time posted etc.

Optical Character Recognition Using Conditional Random Field(CRF) *Mar'17-Apr'17*

- Implemented chain structured CRFs to recognize English words from grayscale images.
- Implemented belief propagation for efficient inference and achieved 90% character-level accuracy

Heart Disease Prediction Using Graphical Models   *Mar'17-Apr'17*

- Modeled and implemented Bayesian Networks using various factors that could affect heart disease.
- Implemented maximum likelihood learning from scratch and achieved 81% accuracy

Disease candidate gene identification and prioritization   Feb'15 - Apr'15

- Disease Gene prioritization using HITS and Page Rank.
- Comparing and analyzing this with results of standard techniques like Toppgene and ENDEAVOUR.

Mini Projects
- Created a model based on General Full Factorial, and analyzed average download speeds of files in DC++.
- Implemented mini search engine which search for a phrase in large number of text file in order of length of phrase.
- Developed a compiler for a subset of C-like programming Language (LL1 grammar) using tools like flex and bison
- Built database application for hospital management.
- Implemented Z buffer algorithm to remove hidden surfaces for set of cubes, Sutherland-Hodgeman Polygon Clipping algorithm, scan filling algorithm.

PUBLICATIONS **Bhanu Teja Gullapalli**, Annamalai Natarajan, Gustavo A. Angarita, Robert T. Malison, Deepak Ganesan, Tauhidur Rahman. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) (UbiComp 19)

Deepak, T. S., Adhya, H., Kejriwal, S., **Gullapalli, B.**, & Shannigrahi, S. (2016, July). A new hierarchical clustering algorithm to identify non-overlapping like-minded communities. In Proceedings of the 27th ACM Conference on Hypertext and Social Media (pp. 319-321). ACM.

WORK EXPERIENCE	**Software Engineer**	Jul'15 - Nov'16

WORK EXPERIENCE

Software Engineer — Jul'15 - Nov'16
Samsung R&D Institute, Bangalore, India
Worked in Video Editor Team of Samsung camera. Primary work was in the applications- Video Editor(Pro/Lite), Highlight player, Slow Motion. Developed and implemented theme mode in Video Editor Pro which assists the user in creating stories (Available from S8 device onwards). Developed a camera based application which uses different composition tools to aid the user in taking good pictures.

Intern — May'14 - Jul'14
Samsung R&D Institute, Bangalore, India
Developed a simulation of OLSR (Optimized Link State Routing) Protocol for Tizen OS. Added APIs which extended the functionalities of the network

TECHNOLOGY SKILLS

Languages: C, C++, Python, Java, Assembly, SQL, Prolog, LATEX.
Packages used: Numpy, Scipy, Theano

ACHIEVEMENTS

- Received Spot Award in Samsung R&D Institute Bangalore for providing good solutions and for coding skills
- Won first prize in an tech-fair at Samsung R&D Institute Bangalore
- Listed among top 0.3% students of 0.5 million appearing in Joint Entrance Exam, IIT-JEE 2011
- Secured 961 rank in All India Engineering Entrance Exam (AIEEE) 2011 taken by 1.2 million people.

COURSES

Theory: Machine Learning Theory, Optimization, Structural Complexity, Theory of computation, Discrete Maths, Data Structures, Algorithms, Probability and Random Processes, .
Systems: Digital Design, Computer Organization and Architecture, Operating Systems,Compilers , Databases , Computer Graphics, Multimedia Systems.
Artificial Intelligence: Artificial Intelligence, Machine Learning, Probabilistic Graphical Models, Computational Biology, Data Mining .
Labs: Databases, Compilers, Networks, Peripherals, System Software, Software Engineering, Systems Programming, Hardware.

EXTRA CURRICULAR ACTIVITIES

- Active member of SIGACT (Special Interest Group in Algorithms and Computation Theory), IIT Guwahati 2013-2015