Achyudh Ram

www.achyudh.xyz | github.com/achyudhk | arkeshav@uwaterloo.ca | +1 (226) 898-2242

Research Objective

Building intelligent software development automation systems by bringing together diverse fields like software analytics, machine learning, information retrieval and social networks.

Education

University of Waterloo, Ontario, Canada

M.Math. (Thesis), Computer Science, *Expected:* August 2020

- Affiliated to the Data Systems Group and the Software Architecture Group

Birla Institute of Technology & Science, Pilani, India

B.E. (Hons.), Computer Science, Graduated with *Distinction*

- *GPA: 9.71/10.0 and Major GPA: 9.73/10.0*

M.Sc. (Hons.), Economics, Graduated with *Distinction*

- *Major GPA: 10.0/10.0*

Undergraduate Thesis

Phase 1: *Assessing the reviewability of code changes and automating the evaluation of GitHub Pull Requests* *Aug '17 – Dec '17*

- Adviser: Prof. Alberto Bacchelli, University of Zurich

Phase 2: *Empirical modeling of sentiments in code review discussions on collaborative coding platforms like GitHub* *Jan '18 – May '18*

- Adviser: Prof. Mei Nagappan, University of Waterloo

Teaching

Teaching Assistant - Neural Networks & Fuzzy Logic *Jan '17 – May '17*
BITS F312 with Tirtharaj Dash, Department of Computer Science,
Birla Institute of Technology & Science, Pilani

Teaching Assistant - Data Structures & Algorithms *Jan '17 – May '17*
CS F211 with Dr. A. Baskar, Department of Computer Science,
Birla Institute of Technology & Science, Pilani

Experience

Research Intern, University of Waterloo *Jan '18 – May '18*

- Worked with the Software Architecture Group and the Computational Health Informatics Lab on the THEMIS.COG project

Research Intern, Delft University of Technology (TU Delft) *Aug '17 – Dec '17*

- Worked with the Software Engineering Research Group (SERG) on developing a pull request reviewability evaluation framework
- Participated in courses on mining software repositories and software engineering methods

Software Developer Intern, Intuit Inc. *May '17 – Jul '17*

- Developed a data engine for layout-based retrieval from the database
- Built a reports engine that uses this data engine to provide performance insights for businesses
- Approx. 400% faster compared to existing solutions due to parallel query evaluation

Research Intern, Indian Bank HQ *May '15 – Jul '15*

- Developed environment sensitive time-series forecasting models for setting business targets

Publications

What Makes a Code Change Easier to Review? An Empirical Investigation on Code Change Reviewability
26th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (2018)

Investigating Type Declaration Mismatches in Python
IEEE Workshop on Machine Learning Techniques for Software Quality Evaluation (collocated with SANER 2018)

Research Projects

Detecting inconsistencies between Python code and comments *Sep '17 – Nov '17*
Advisers: Dr. A. Bacchelli, L. Pascarella GitHub: achyudhk/PyFunc-Signature-Parser
An analysis of type inconsistencies between source code and method docstrings in Python across popular Python libraries and building an automated tool to identify these inconsistencies.

Analysis framework for decoding online developer communities *Dec '15 – May '17*
Adviser: Prasad Talasila GitHub: achyudhk/Mailing-List-Network-Analyzer
An analysis of author interaction through community detection in mailing lists, IRC channels and Slack teams using a text mining based approach to identify topic experts and label communities, in order to examine the activity and decode the structure of the developer communities.

Fitness-aware brokering of hosted containerized environments *Jan '17 – May '17*
Adviser: Dr. Santonu Sarkar GitHub: achyudhk/Fitness-Aware-Container-Brokering
An integration agent that benchmarks and containerizes a SaaS catalog offering and a smart fulfillment engine that deploys it into the best-fit container out of a set of containers hosted on various underlying clouds. *In association with IBM Research Labs.*

Novel feature selection using Fuzzy C-Means clustering *Feb '17 – Apr '17*
Adviser: Dr. Rajendra Roul GitHub: achyudhk/FCM-Feature-Selection
Feature selection using cosine similarity scores on the semantic centroids calculated from the normalized term-term correlation factors based on Fuzzy C-Means clustering. Selected features resulted in comparable F-scores for classification compared to MI and χ^2

Semantic segmentation using a deconvolution network *Mar '17 – Apr '17*
Neural Networks Course Project Reference: arXiv:1505.04366
A deconvolution network that can identify Red Blood Cells in an input image by predicting a binary segmentation mask.

Video translation of American Sign Language gestures *Nov '16 – Dec '16*
Machine Learning Course Project GitHub: achyudhk/Sign-Language-Recognition
An ensemble classifier that applies hard negative mining and non-maximal suppression for localization, using histogram of gradients and local binary patterns as features. Achieved an accuracy of ∼99% on localization and 96.8% on top-5 classification (IoU metric).

Identifying the trends in Indian Legislative issues using NLP *Aug '16 – Dec '16*
Adviser: Dr. Anoop Kumar GitHub: achyudhk/Parliamentary-Debate-NLP
Identification of latent structures within parliamentary debates using natural language processing to discover seasonal trends in the debates of the upper and lower houses.

Miscellaneous Projects

- Feed-forward Neural Network library using computational gate approach supporting multiple optimizers, common activation and loss functions
- Implementation of state of the art Deep Learning papers on Google SVHN and MNIST datasets
- Implementation of machine learning algorithms like Support Vector Machines, Principal Component Analysis, K-means Clustering, Fuzzy C-means Clustering in Python
- Design and implementation of MIPS single-cycle, multi-cycle and pipelined architectures
- Network Topology Simulation and Analysis using Wireshark, NS2, NAM, xGraph and AWK
- Multi-user chat service using socket programming with multicast and broadcast messages
- FTP client and server using socket programming
- BibTeX Parser and Code Beautifier for C using LEX and YACC
- Weather monitoring station design and simulation using μ–processor programming and interfacing

Talks and Presentations

Google Developer Group, Goa

- Leveraging the power of Virtualization, Docker and the Cloud *Apr '17*

Department of Economics, BITS Pilani

- Monte-Carlo methods to assess the feasibility of biofuel production using simulation of economic models (Adviser: Dr. Rajorshi Sen Gupta) *Nov '15*
- Cross country analysis of statistical models for assessing the effect of economic factors on insurance penetration (Adviser: Dr. Aswini Kumar Mishra) *May '16*
- Rationality, uncertainty and cognition in financial markets – An experimental approach using double auction asset market simulation (Adviser: Dr. Anoop Kumar) *May '17*

Selected Coursework

Computer Science

Machine Learning, Neural Networks & Fuzzy Logic, Information Retrieval, Mining Software Repositories, Software Engineering Methods, Parallel Computing, Compiler Design, Computer Networks, Design & Analysis of Algorithms, Data Structures & Algorithms, Discrete Structures in Computer Science, Operating Systems, Computer Architecture, Principles of Programming Languages, Theory of Computation, Database Systems, Object Oriented Programming, Logic in Computer Science, Microprocessor Programming & Interfacing, Computer Programming, Digital Design

Mathematics

Multivariable Calculus, Linear Algebra, Differential Equations, Probability & Statistics, Advanced Econometrics, Mathematical & Statistical Methods

Skill Set

Languages

C, C++, Python, Java, JavaScript, BASH, SQL, HTML, CSS

Frameworks

Amazon Web Services, Google Cloud Platform, Firebase, Docker, Scikit-Learn, Numpy, Matplotlib, NLTK, Gensim, Keras, NetworkX, Flask, Scikit-Image, Chart.js

Awards and Scholarships

Institute Merit Scholarship — BITS Pilani *Aug '14 – May '18*

Awarded six times for being ranked within the top 1% of the university's students by GPA

Bhushan Bhatia Graduate Application Scholarship — BITSAA *Feb '18*

Awarded based on academic performance to cover graduate application expenses

Research Travel Grant — IPCD, BITS Pilani *Aug '17*

Awarded in recognition of my senior thesis at TU Delft

HackAttack 2017 Runners-up — Intuit Inc. *Jun '17*

Built *Foresight*, an Android app that uses object detection, realtime databases, and Google Places API to help the differently-abled navigate better

IUCAE Grant — Inter-University Centre for Alternative Economics *Apr '17*

Awarded towards experimental work on *Rationality, Uncertainty and Cognition in Financial Markets* with Dr. Anoop Kumar

Duke of Edinburgh International Award — Bronze Category *Jul '13*