Anirban Lekharu

Curriculum Vitae

North Guwahati, Vill: Rudresswar
P.O. Rangmahal, Kamrup(R)
Assam, India-781039
+91 9707617578
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Research Interests

- Multimedia Streaming Technologies
- 5G Network Services like Network Slicing and Caching
- Machine Learning
- Computer Vision
- Multimedia Security

Education

2018–2023 **PhD**, *Indian Institute of Technology Guwahati*, (Pursuing).
Department: Computer Science and Engineering

2015–2017 **MTech**, *Indian Institute of Technology Guwahati*, *C.P.I: 8.67*.
Department: Computer Science and Engineering

2008–2012 **B.E**, *Girijananda Chowdhury Institute of Management and Technology*, Guwahati, *Percentage: 82.74%*.
Department: Computer Science and Engineering

2008 12^{th}, *Faculty Higher Secondary School*, North Guwahati, *Percentage: 81%*.
CBSE, Science

2006 10^{th}, *Faculty Higher Secondary School*, North Guwahati, *Percentage: 89%*.
CBSE

Work Experience

February, 2013- February,2017 **Designation: Junior Project Fellow**, *in the Department of Computer Science and Engineering*, Indian Institute of Technology Guwahati.

Project: Design, Development of a Watermarking System for a Scalable Video Authentication.

Details of Job Profile:.

- Designed and Integrated the various modules of our Watermark Evaluation Tool (Patent Applied)
- Tested the Watermark Framework on different types of videos
- Implemented and Integrated a Dynamic Video Streaming solution in the project webpage: `http://www.iitg.ernet.in/cseweb/ddwssva/mpeg_dash.html`

- Designed and Maintained the Multimedia Lab and Project web pages
- Purchase of Equipments like server, workstation and such other Equipments for the Multimedia Lab

Publications

Conferences

2019

- **Anirban Lekharu**, Y Mouli, Arijit Sur, Arnab Sarkar, **LSTM-CNN based multivariate prediction model for Adaptive Video Streaming (Under Progress)**

2018

- **Lekharu, A.**, Kumar, S., Sur, A., Sarkar, A.: ***"A QoE Aware LSTM based Bit-Rate Prediction Model for DASH Video"***. In IEEE 10^{th} International Conference on COMmunication Systems and NETworkS (Comsnets), January 3-7, 2018, Bangaluru, India. DOI: 10.1109/COMSNETS.2018.8328225, ISBN: 978-1-5386-1182-1, URL: http://ieeexplore.ieee.org/document/8328225/

- **Lekharu, A.**, Kumar, S., Sur, A., Sarkar, A.: ***"A QoE Aware SVC Based Client-side Video Adaptation Algorithm for Cellular Networks"***. In ICDCN 18: 19^{th} International Conference on Distributed Computing and Networking, January 4–7, 2018, Varanasi, India. ACM, New York, NY, USA. DOI: 10.1145/3154273.3154312 ISBN: 978-1-4503-6372-3/18/01 URL: https://doi.org/10.1145/3154273.3154312

2015

- Gaj, S., Rana, S., **Lekharu, A.**, Sur, A., Bora, P.: ***"RST Invariant Multi View 3D Image Watermarking Using DWT and SVD".*** in Proceedings of the Fifth National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics 2015. DOI: 10.1109/NCVPRIPG.2015.7490066 URL: `http://dx.doi.org/10.1109/NCVPRIPG.2015.7490066`

Patents

2016

- **Watermark Evaluation Tool** (Patent Applied) Application No: T.I.(47)/TIFA/2016 dt. August 24, 2016

Academic Training

Title *Networking: Subnetting and a study on the allocation of IP Address allocation of Guwahati Refinery LAN and its subnet addresses*

Organization Indian Oil Corporation Ltd Guwahati

Master Thesis

Title *QoE Aware Client-side Video Adaptation Algorithm for Cellular Networks*

Supervisor Dr. Arijit Sur, Associate Professor, Dept. of Computer Science and Engineering, IIT Guwahati

Description In this work two client-side rate adaptation models are proposed for the Adaptive Video Streaming for maximizing the Quality of Experience (QoE) of an end-user.

QoE aware Video Quality Adaptation Framework (VQAF)

- In the first phase Client-side scalable Video Coding (SVC) based bit-rate adaptation framework with two distinct phases is proposed.
- *Download Phase* which fetches new segments at selected quality levels until buffer size reaches a stipulated safety threshold (Th_{safe}).
- *Smooth-out* phase which repeatedly upgrades a subset of the already downloaded segments by one enhancement level, until buffer size reduces below (Th_{safe}).

Machine Learning based Rate Prediction Model (VBPM)

- In the next phase a Machine Learning based Rate Prediction model using Long Short Term Memory (LSTM) for Adaptive Streaming over HTTP is proposed.
- A *Rate Labelling* phase which labels the HTTP stream captured from the trace files.
- *Training phase* which uses a set of historical QoE related performance metrics as the feature set and the corresponding actual best video rate r_k of the received segment for training the prediction model.
- Video Bit-rate *Prediction phase* which predicts the best video rate of the next requested segment.

Bachelor Thesis

Title *An Approach to Develop a Clustering Algorithm for Mixed Data Type*

Description Project on developing an algorithm for clustering mixed data type which is based on modified K-mean algorithm for mixed type clustering using a centroid Frequency Vector as cluster centre for each cluster

Research Experience

Title ***Design, Development of a Watermarking System for a Scalable Video Authentication***

- The Proposed Framework evaluates the robustness of the video watermarking schemes against content adaptation attacks as well as general attacks.
- Designed and Integrated the various modules of our Framework.
- Tested the Watermark Framework on different types of videos.

Title ***Image Captioning with Attention Networks***

- Implemented a model on Image Captioning using Attention Networks.
- The model was able to generate text descriptions of images which not only captures the objects contained in an image, but it also must express how these objects relate to each other.

Title ***Activity Recognition for Energy Efficiency in Workplace***

- Presented a model for Human Activity Recognition using Sensor data.

- The model comprised of a PIR, PING and LIGHT sensors which gave us different sensor values of the people activities in performed in the Robotics Lab, Dept. of CSE, IIT Guwahati.
- Implemented some widely used algorithms to recognize the human activities in the Lab.

Title ***Security Issues of Internet of Things Smart Home Applications***

- Surveyed and presented a comparative study of various research papers, which found flaws in security mechanism used by ZigBee that works on IoT devices for smart home applications.

Software Skills

Languages	C, C++, Python, Matlab, Javascript, HTML5
Simulators	ns-3, LTE-*Sim*
Designing	Illustrator, Photoshop, Qt
Web Services	DASH*(Dynamic Adaptive Streaming over HTTP)*
Operating Systems	Ubuntu, Windows, Centos

Educational Achievements

- Reviewer of **International Conference on Pattern Recognition and Machine (PReMI)**
- Participated and Presented Paper in **IEEE 10th International Conference on COMmunication Systems and NETworkS (Comsnets)** 2018, held in Bangalore
- Organizing Committee member of "**Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP)**", 18 - 22 December, 2016.
- **First Class First** in BE (Computer Science and Engineering) under Gauhati University (2012)
- Awarded the **Simon Kachari Award** for all round best student of Faculty Higher Secondary School (2007-08)
- Participated in International Informatics Olympiad (2007)

References Available to Contact

- **Dr. Arijit Sur**

E-mail: arijit@iitg.ac.in

Phone: 0361-2582361

Dr. Sur is my PhD Supervisor and was also my Master's Thesis Supervisor

- **Dr. Arnab Sarkar**

E-mail: arnabsarkar@iitg.ac.in

Phone: 0361-2583252

Dr. Sarkar is my PhD Co-Supervisor

○ **Prof. Prabin Kumar Bora**
E-mail: prabin@iitg.ac.in
Phone: 0361-2582052

Personal Details

Date of Birth	31^{st} August, 1989
Father's Name	Gopal Chandra Lekharu
Mother's Name	Anupama Lekharu
Languages	English, Hindi, Assamese

Address for Correspondance

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Permanent Address

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Declaration

ALL THE INFORMATION PROVIDED ABOVE ARE TRUE TO THE BEST OF MY KNOWLEDGE.

Date:
Place:

(Anirban Lekharu)