

Aishik Mandal

📞 (+91) 9800695370 • ✉ jitaishik@gmail.com • 🌐 jitaishik.github.io
📄 Aishik Mandal

Education

- **Technical University of Darmstadt** 2023-
PhD in Computer Science,
- **Indian Institute of Technology, Kharagpur** CGPA: 9.61/10
Bachelor of Technology in Electronics and Electrical Communication Engineering,
Master of Technology in Artificial Intelligence, Machine Learning and Applications 2018-2023
Minor in Computer Science and Engineering
Micro Specialisation in Embedded Control, Software, Modelling and Design

Internships

- **Multimodal Turn Taking in Conversational Agents** INRIA Paris, France
Under Prof. Justine Cassell, [Articulabo](#), [Cognitive Machine Learning Group](#) May 2022-Dec 2022
 - Proposed the use of **transformer based models** to improve turn taking in conversational agents using audio and verbals.
 - Proposed model shows an improvement of **0.09** on macro F1 score over the state of the art model for predicting turn-taking.
 - Pre-processed raw video data to extract **visual features** using OpenFace toolkit and **acoustic features** using OpenSmile toolkit.
 - Created dataset comprising of features from all the modalities: **video, audio and verbals** for training multimodal models.
 - Currently **testing novel models using all modalities** to improve turn taking prediction of conversational agents.
- **Revenue Function of Hierarchical Clustering in Comparison Framework** TU Munich, Germany
Under Prof. Debarghya Ghoshdastidar, [Theoretical Foundations of AI](#) Jun 2021-Aug 2021
 - Proposed a **novel revenue function** to evaluate the **meaningfulness of the dendrograms** produced by **hierarchical clustering algorithms** in a **comparison framework**.
 - Showed that the **proposed comparison-based revenues** are equivalent to **Dasgupta's cost or revenue** applied to particular pairwise similarities that can be computed from comparisons.
 - Proposed two **variants of average linkage hierarchical clustering** based on passive triplet or quadruplet comparisons.
 - Empirically **compared the performance** of these new approaches with state of the art baselines in synthetic and real datasets.
 - Published the work at TMLR, March 2023.

Projects

- **Discourse Mutual Information for Dialogue Understanding and Response Generation** IIT Kharagpur
Bachelor's Thesis, under Prof. Pawan Goyal, [Department of Computer Science and Engineering](#) Dec 2020-Apr 2021
 - Performed extensive experimentation on a transformer based dual encoder architecture to encode context and response in a dialog, with the purpose of increasing the proposed **Discourse Mutual Information** objective function.
 - Performed various downstream **dialog-understanding tasks** as a means of evaluating the representations learned.
 - Achieved an accuracy improvement of upto **5.8%** on **dialog classification tasks** and upto **15.3%** on **dialog evaluation tasks** over state of the art baselines while performing at par with the baselines on response selection tasks.
 - Designed and trained a **decoder** to obtain responses from response encoding and proposed **algorithms** to map context encoding to response encoding.
 - Performed **exploratory analysis** to understand the **features captured** by the encoder.
 - Published the work at NAACL 2022.
- **Knowledge-Aware Neural Networks for Medical Forum Question Classification** IIT Kharagpur
Under Prof. Niloy Ganguly, [Complex Networks Research Group\(CNeRG\)](#) May 2020-May 2021
 - **Finetuned** the proposed model, a novel application of **BERT-based dual encoder**, for medical forum question classification.
 - Performed **ablation analysis** on the proposed MedBERT Model showing the importance of local and global encoders.
 - Showed an improvement in accuracy of about 3% over the baselines in low resource setting (using 30% fraction of dataset).
 - Published the work at CIKM 2021.

- Universal Transformer for Multimodal Self-supervised Learning** IIT Kharagpur
○ *Master's Thesis, under Prof. Jiaul Hoque Paik, Centre of Excellence in AI(CoEAI)* Aug 2022-Apr 2023
- Proposed a **novel loss function** to train a transformer which can **encode images and texts in a shared embedding space**.
 - **Trained a vanilla transformer encoder** from scratch with the proposed loss function on CoCo image captioning dataset.
 - **Evaluated** the performance of the Universal Transformer in **multimodal and single modality situations**.
 - Conducted **error analysis** and suggested **adversarial training** to achieve improvements.

Publications

- **A Revenue Function for Comparison-Based Hierarchical Clustering**
Aishik Mandal, Michaël Perrot, Debarghya Ghoshdastidar, *Transactions on Machine Learning Research (TMLR, March 2023)* ([Link to the paper](#))([Code-base Link](#))
- **Representation Learning for Conversational Data using Discourse Mutual Information Maximization**
Bishal Santra, Sumegh Roychowdhury, **Aishik Mandal**, Vasu Gurram, Atharva Naik, Manish Gupta, Pawan Goyal, *2022 Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL 2022)* ([Link to the paper](#)) ([Link to project webpage](#))
- **Knowledge-Aware Neural Networks for Medical Forum Question Classification**
Soumyadeep Roy, Sudip Chakraborty, **Aishik Mandal**, Gunjan Balde, Prakhar Sharma, Anandhavelu Natrajan, Megha Khosla, Shamik Sural, Niloy Ganguly, *30th ACM International Conference on Information and Knowledge Management (CIKM 2021)* ([Link to the paper](#)) ([Code-base Link](#))

Skills and Expertise

- **Programming Languages and Softwares:** Python | C++ | C | MATLAB | OpenSmile | OpenFace | Elan
- **Libraries:** PyTorch | TensorFlow | Keras | ScikitLearn | Pandas | NumPy

Coursework

- **Institute Courses:**Algorithm-I* | Natural Language Processing | Probability and Stochastic Processes | Digital Signal Processing* | Linear Algebra for AI | AI Foundations and Applications | Machine Learning Foundations and Applications* | Deep Learning Foundations and Applications | Graphical and Generative models for Machine Learning | Dependable and Secure AI-ML
 - **Online Courses(Coursera):**DL Specialisation | TensorFlow in Practice Specialisation | Data Visualisation with Python
- (* indicates both lab and theory courses)

Awards And Achievements

- **Department Rank:** Holding rank 1 among 37 students in Artificial Intelligence, Machine Learning & Applications.
- **DAAD WISE Awardee:** Received WISE scholarship for summer internship at TU Munich (2021).
- **Charpak Lab Scholarship Awardee:** Received Charpak Lab scholarship for summer internship at INRIA (2022).
- **GKF International Internship Scholarship:** Received Guru Krupa IITKGP Foundation Scholarship from IITKGP Foundation for summer internship at INRIA (2022).
- **KVPY:** Qualified Kishore Vaigyanik Proysahan Yojana with AIR 578 in SA (2017) and AIR 891 in SX (2018).
- **JEE Advanced:** Secured an AIR 1093 in JEE Advanced (2018), conducted by IIT, among 200k candidates.
- **NSEP:** Qualified National Standard Examination in Physics (2018) in National Top 1% among 50k candidates.
- **NSEA:** Qualified National Standard Examination in Astronomy (2018) among 20k candidates.

Extra Curricular Activities

- **Google Research Week, Google Research India(2023):** Attended Google Research Week, a three day long research event for undergraduates, graduates and professionals working in the field of AI, organised by Google Research India.
- **Teaching Assistant, IIT Kharagpur(2023):** Teaching Assistant for Big Data Processing in spring semester 2023.
- **National Service Scheme, IIT Kharagpur(2018-2020):** Volunteer of NSS and Co-Leader of the teaching team.
- **Student Welfare Group Mentor, IIT Kharagpur(2020-2021):** Mentor for 5 junior undergraduate students.