ARKA MITRA

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Objective

Recent graduate from ETH Zurich with a B work permit. Highly motivated and skilled Computer Scientist with a passion for cutting-edge technologies and a strong background in computer vision, natural language processing, and graph neural networks. Seeking opportunities to contribute my expertise and creativity to innovative projects in a challenging and dynamic environment.

Education

- **ETH Zurich** Sep. 2021 – Ongoing
  Masters of Science in Electrical Engineering and Information Technology *CGPA: 5.2/6.0*
- **Indian Institute of Technology, Kharagpur, India** *Jul. 2017 – Apr. 2021*
  Bachelor of Technology in Electronics and Electrical Communication Engineering *CGPA: 9.29/10.00*
  Minor in Computer Science and Engineering *CGPA: 9.52/10.00*
- **South Point High School, India** *Mar. 2017*
  Central Board of Secondary Education, Class XII *Aggregate: 94.8%*
  West Bengal Board of Secondary Education, Class X *Aggregate: 93.4%*

Internships and Work Experience

- **Dr. Blumer: Quantitative Researcher** *Dec. 2023 – Jun. 2024*
  - *Head IT in a family-based office in Zurich.*
  - *Developed strategies for daily and intraday data.*
  - *Generated a website for automated portfolio management.*
- **Microsoft: Document and Query Matching** *Jun. 2021 – Aug. 2021*
  - *Worked as a Data and Applied Scientist for the question answering team of Bing.*
  - *Created a modified version of sentence transformers for query to document matching.*
  - *Helped to remove bugs in the SnR pipeline for Bing.*
- **MILA: Artificial Intelligence in Medical Domain** *Apr. 2020 – Sep. 2021*
  - *Selected as GRI intern for MITACS 2020.*
  - *Calculated feature importance of various factors on death of a person affected by Covid-19.*
  - *Developed an interactive platform for predicting the number of cases.*
  - *Explored the impact of reopening of schools on the number of Covid-19 cases.*
  - *Implemented fuzzy cognitive maps for explainations.* *Prof. Samira A. Rahimi, Prof. Jackie C.K. Cheung*
- **University of Turku: Covid-19 Detection; Explainable AI** *Jun. 2020 – Aug. 2021*
  - *Selected as a FT Research Intern.*
  - *Evaluated different models to detect Covid-19 from CT scans.*
  - *Combined deep learning and classical machine learning to improve metrics on smaller datasets.*
  - *Conducted a review on different explainable AI models.* *Prof. Abdulhamit Subasi*
- **Honeywell: Bird Pathway Prediction Algorithm** *Jun. 2020 – Jul. 2020*
  - *Worked as a software engineer intern.*
  - *Implemented various object detection algorithms for finding birds and drones.*
  - *Secured third position in 3^{rd} Drone vs Bird Challenge organized by WOSDETC.*
  - *Appended the algorithm into Honeywell servers for access within the Honeywell servers.*

Publications

Subasi, A., Ozaltin, O., **Mitra, A.**, Subasi, M. E. , Sarirete, A. (2023). Trustworthy artificial intelligence in healthcare. In Accelerating Strategic Changes for Digital Transformation in the Healthcare Industry (pp. 145 - 177). Elsevier.

- Albanese, G., **Mitra, A.**, Zaech, J.-N., Zhao, Y., Chhatkuli, A., Van-Gool, L. (2023). Optimizing long-term player tracking and identification in nao robot soccer by fusing game-state and external video. In ICRA Workshop on Collaborative Perception and Learning, IEEE, 2023.
- Nguyen. Q, **Mitra, A.** (2022). Causality Detection using Multiple Annotation Decisions. In Proceedings of the 5th Workshop on Challenges and Applications of Automated Extraction of Socio-political Events from Text (CASE), EMNLP, pages 79–84.
- Rahimi, S. A., Kolahdoozi, M., **Mitra, A.**, Salmeron, J. L., Navali, A. M., Sadeghpour, A., Mir Mohammadi, S. A. (2022). Quantum-inspired interpretable AI-empowered Decision Support System for detection of early-stage rheumatoid arthritis in primary care using scarce dataset. Mathematics, 10(3), 496. https://doi.org/10.3390/math10030496
- Coluccia, A., Fascista, A., Schumann, A., Sommer, L., Dimou, A., Zarpalas, D., Méndez, M., de la Iglesia, D., González, I., Mercier, J.-P., Gagné, G., **Mitra, A.**, Rajashekar, S. (2021). Drone vs. Bird detection: Deep learning algorithms and results from a grand challenge. Sensors (Basel, Switzerland), 21(8), 2824. https://doi.org/10.3390/s21082824
- **Mitra, A.**, Jana, G., Pal, R., Gaikwad, P., Sural, S., Chattaraj, P. K. (2021). Determination of stable structure of a cluster using convolutional neural network and particle swarm optimization. Theoretical Chemistry Accounts, 140(3). https://doi.org/10.1007/s00214-021-02726-z
- **Mitra, A.**, Srivastava, H., Tiwari, Y. (2020). IITkgp at FinCausal 2020, shared task 1: Causality detection using sentence embeddings in financial reports. In Proceedings of the 1st Joint Workshop on Financial Narrative Processing and MultiLing Financial Summarisation, COLING, 95–99.
- Subasi, A., **Mitra, A.**, Ozyurt, F., Tuncer, T. (2021). Automated COVID-19 detection from CT images using deep learning. In Computer-aided Design and Diagnosis Methods for Biomedical Applications (pp. 153–176). CRC Press.
- **Mitra, A.**, Jana, G., Agrawal, P., Sural, S., Chattaraj, P. K. (2020). Integrating firefly algorithm with density functional theory for global optimization of Al42− clusters. Theoretical Chemistry Accounts, 139(2). https://doi.org/10.1007/s00214-020-2550-y
- **Mitra**, A., Chakravarty, A., Ghosh, N., Sarkar, T., Sethuraman, R., Sheet, D. (2020). A systematic search over deep convolutional neural network architectures for screening chest radiographs. Annual International Conference of the IEEE EMBC. IEEE Engineering in Medicine and Biology Society. Annual International Conference, 2020, 1225–1228. https://doi.org/10.1109/EMBC44109.2020.9175246
- Jana, G., **Mitra, A.**, Pan, S., Sural, S., & Chattaraj, P. K. (2019). Modified particle Swarm Optimization algorithms for the generation of stable structures of carbon clusters, Cn (n = 3-6, 10). Frontiers in Chemistry, 7, 485. https://doi.org/10.3389/fchem.2019.00485

Selected Projects

Change Detection using 3D Scene Graphs *Dec. 2022 – Jul. 2022*

- *Identified scene changes using semantic segmentation and created scene graphs for object matching using the Sinkhorn algorithm.*
- *Successfully detected object states within an end-to-end differentiable pipeline, leveraging PointNet for segmentation as a part of my Master Thesis.*
- *Improved the Sinkhorn algorithm by providing object priors.* *Prof. Marc Pollefeys*

Long-term Tracking of Nao Robots *Feb. 2022 – May. 2023*

- *Created a pipeline for tracking of Nao robots using sensor data from the robots and video footage of the robots playing.*
- *Made the method robust to cost uncertainty by optimization of weights for each sensor.*
- *Combined the different tracklets for life-long tracking by tracklet-track matching.* *Prof. Luc van Gool*

Dynamic Weighing for Multi-task Learning *Dec. 2021 – Apr. 2022*

- *Implemented and combined different weight based and gradient based methods for dynamic weighing for the losses in multi-task learning.*
- *Explored how different methods mitigate different noises in the input.*
- *Created a new regularization technique to improve performance in single task settings.* *Prof. Luc van Gool*

Research Assistant at UZH *Feb. 2022 – Jun. 2022*

- *Worked as a research assistant in an experimental economics project.*
- *Converted sentences into embeddings to observe patterns in conversations.* *Prof. Roberto Weber*

Computer Vision at NomadZ *Oct. 2021 – Ongoing*

- *Worked on various computer vision and perception algorithms for Nao robots.*
- *Implemented light-invariant ball detection model.*
- *Designed human action recognition using 3D-LSTM model.*
- *Created an automated pipeline for data annotation.*
- *Improved the latency of various tensorflow models.*

Biometric Identification using Iris Recognition *May. 2020 – Ongoing*

- *Used gated mechanism for masking critical region of people's eyes.*
- *Created an end-to-end trainable pipeline for Iris recognition.* *Prof. Pabitra Mitra*

Adversarial Robustness Using Radial Basis Functions *Jun. 2020 – Jun. 2021*

- *Generated Deep Radial Basis Modules which can be added to any classification model as my bachelor thesis co-supervised with Columbia University.*
- *Showed how Radial Basis Functions can theoretically prevent FGSM adversarial attacks.*
- *Verified the effectiveness on MNIST dataset.* *Prof. Shamik Sural*

Positions of Responsibility

- **Student Researcher – *NomadZ, ETHZ*** *Oct. 2021 – Ongoing*
  - *Head of Computer Vision in the RoboSoccer team, ETH Zurich.*
  - *Presented in various events like Swiss Robotics Day 2022.*
  - *Obtained travel grants for going to RoboCup 2022, 2023 and GORE 2023.*
- **Mentor – *Deeplearning.ai*** *Mar. 2020 - Dec. 2022*
  - *Alpha tester for the courses in Deeplearning.ai.*
  - *Mentor to students in the NLP, GAN, Tensorflow 3 specialization available on Coursera.*
- **WebMaster – *IEEE, IIT Kharagpur*** *Jan. 2019 – Aug. 2020*
  - *Maintained the website for IEEE Student Branch of IIT Kharagpur.*
  - *Active member of the student branch and helped in organizing events.*
- **Volunteer - Nation Service Scheme** *Aug. 2017 - Jun. 2019*
  - *Taught middle school students in nearby villages.*
  - *Won best volunteer award for work done in 2017.*

Achievements

- Obtained second position in Datathon by Axpo and third position in GCC competition. *2024*
- Invited for demo of NomadZ at UN AI for Good Event. *2024*
- Obtained KIM Grant, NCCR Automation Grant, NCCR Robotics Grant for NomadZ. *2022-2023*
- Reached the final of HackZurich as one of the finalists. *2022*
- Awarded Prof. Somnath Sengupta Memorial Award for best undergraduate academic researcher. *2021*
- Selected in Natural Language Understanding Track of Google Research India Summer School. *2020*
- Selected for MITACS Globalink Scholarship. *2020*

Academic Extra-curricular

- One of the organizers of Medical Imaging using Deep Learning Conference. *2022*
- Reviewer for EMNLP 2022, FIRE 2021, BMC Journal. *2021- 2024*
- Supervised a Bachelor Student at ETH Zurich. *2022*
- Teaching Assistant for Projects and Seminar at D-ITET, ETH Zurich. *2022- 2023*

Skills

- **Research Interests: Computer Vision, Natural Language Processing, Graph Neural Networks**
  - **Languages:** C++, Python, C, Java, SQL, Julia, MATLAB, Javascript
  - **Libraries, packages and frameworks:** Pandas, Tensorflow, Keras, PyTorch, Git, NLTK, OpenCV