# Tathagata Bandyopadhyay

Tübingen, Germany
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## Education

**Technical University of Munich** **Oct. 2019 – Mar. 2024**
*M.Sc. in Informatics* | *Grade:* **1.4** *(in German Scale)* | *Passed with Distinction* *Munich, Germany*

**KIIT University** **Aug. 2013 – May 2017**
*B.Tech. in Computer Science* | *Grade:* **1.3** *(in German Scale)* | *Founder's All-rounder Gold Medalist* *Bhubaneswar, India*

## Experience

**University of Tübingen (Autonomous Vision Group)** **Dec. 2025 – Present**
*Research Assistant* *Tübingen, Germany*

- Working on semantic understanding of visual generative (diffusion / flow-matching) models
- Exploring how the visual semantic concepts emerge, evolve and interact in video generation

**University of Tübingen (Autonomous Learning Group)** **Jun. 2025 – Nov. 2025**
*Research Intern* *Tübingen, Germany*

- Worked on sparse feed-forward 3D Gaussian Splatting (3DGS) for multi-view 3D reconstruction.
- Patch-particle based efficient hybrid representation for neural spatio-temporal world modeling.

**Max Planck Institute for Intelligent Systems (Optics and Sensing Lab)** **Dec. 2024 – May 2025**
*Research Intern* *Tübingen, Germany*

- Worked on video understanding for analyzing non-verbal communication using computer vision
- Developed a Video Quality Analyzer tool to quickly extract video insights.
- Semantic latent representation learning for diverse human attributes like pose, style, skin-tone etc.

**Siemens (Technology)** **Mar. 2023 – Sep. 2024**
*Working Student Researcher* *Munich, Germany*

- Developed an Intuitive Natural Language Query system for Knowledge Graphs using LLMs.
- Implemented Retrieval Augmented Generation (RAG) on Knowledge Graphs using graph traversal
- Filed 3 Invention Disclosures (Patents) and published 2 Research Papers.

**Technical University of Munich** **Apr. 2021 – Sep. 2022**
*Teaching Assistant (TA) for Introduction to Deep Learning (I2DL IN2346)* *Munich, Germany*

- Designed hands-on exercises for Deep Learning course using PyTorch, NumPy and Python.
- Taught Deep Learning Exercises to more than 1000 international students of TUM.
- Prepared examination questions for Deep Learning and graded student answer papers.

**Dell Technologies** **Jul. 2017 – Sep. 2019**
*Software Engineer I* *Bangalore, India*

- Developed an Intelligent Price Recommendation Engine with Statistical Modelling of historical price data.
- Utilized Web Scrapping using Python, Pandas, NumPy and BeautifulSoup to collect and analyse market price.
- Applied Test Driven Development (TDD) and CI-CD pipelines to improve code quality

## Publications

- **Tathagata Bandyopadhyay**. Spectron: Target speaker extraction using conditional transformer with adversarial refinement. *arXiv preprint arXiv:2409.01352*, 2024

- Nilay Tufek-Oezkaya, Burak Yigit Uslu, Valentin Philipp Just, **Tathagata Bandyopadhyay**, Aparna Saissre Thuluva, Marta Sabou, and Allan Hanbury. A new retrieval-augmented generation (rag) approach for querying and constructing large-scale knowledge graphs. *semantic-web-journal*, 2024

- Nilay Tufek, Aparna Saissre, Valentin Philipp Just, Fajar J. Ekputra, **Tathagata Bandyopadhyay**, Marta Sabou, and Allan Hanbury. Validating semantic artifacts with large language models. In *Proceedings of The Semantic Web – 21st International Conference, ESWC 2024*. Springer, ESWC 2024, 2024

- **Tathagata Bandyopadhyay**, Jan Kubicek, Marek Penhaker, Juraj Timkovic, David Oczka, and Ondrej Krejcar. A semi-supervised learning approach for automatic segmentation of retinal lesions using surf blob detector and locally adaptive binarization. In *Proceedings of the 11th ASIAN Conference on Intelligent Information and Database Systems (ACIIDS 2019)*, pages 311–323. Springer, LNCS(LNAI), volume 11432, 2019

- **Tathagata Bandyopadhyay**, Shyamali Mitra, Sreetama Mitra, Luis Miguel Rato, Nibaran Das, and Mrinal Kanti Naskar. A fast algorithm for automatic segmentation of pancreas histological images for glucose intolerance identification. In *Recent Developments in Machine Learning and Data Analytics (IC3 2018)*, pages 307–315. Springer, AISC, volume 740, 2018

- Rajdeep Chatterjee, **Tathagata Bandyopadhyay**, Debarshi Kumar Sanyal, and Dibyajyoti Guha. Comparative analysis of feature extraction techniques in motor-imagery eeg signal classification. In *Proceedings of First International Conference on Smart Systems, Innovations and Computing*, pages 73–83. Springer, SIST, volume 79, 2018

- **Tathagata Bandyopadhyay**, Sreetama Mitra, Shyamali Mitra, Luis Miguel Rato, and Nibaran Das. Analysis of pancreas histological images for glucose intolerance identification using wavelet decomposition. In *Proceedings of the 5th International Conference on Frontiers in Intelligent Computing: Theory and Applications*, pages 653–661. Springer, AISC, volume 515, 2017

- Rajdeep Chatterjee, **Tathagata Bandyopadhyay**, Debarshi Kumar Sanyal, and Dibyajyoti Guha. Dimensionality reduction for eeg signal using fuzzy discernibility matrix. In *Proceedings of the 10th International Conference on Human System Interaction (HSI)*, pages 131–136. IEEE, 2017

- Rajdeep Chatterjee, **Tathagata Bandyopadhyay**, and Debarshi Kumar Sanyal. Effects of wavelets on quality of features in motor-imagery eeg signal classification. In *Proceedings of International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET)*, pages 1346–1350. IEEE, 2016

- Rajdeep Chatterjee and **Tathagata Bandyopadhyay**. Eeg based motor imagery classification using svm and mlp. In *Proceedings of 2nd International Conference on Computational Intelligence and Networks (CINE)*, pages 84–89. IEEE, 2016

## Patents

- An LLM based method for contextual dynamic entity extraction from a Natural Language Sentence and linking them to a structured text source. (filed)

- A graph traversal method for contextual sub-graph extraction from a knowledge graph for natural language based interactive question answering. (Submitted)

- Simplifying the generation of formal queries from natural language OPC UA queries using Large Language Models. (filed)

## Projects

**Neural Parametric 3D Head Models with 2D GANs** | *Python, PyTorch, PyVista, Meshlab, Wandb* **Dec. 2023**
- Developed a neural parametric head model to reconstruct 3D head geometry from partial point clouds or depth scans.
- Utilized neural network to predict 3D signed distance field as an implicit 3D head representation.
- Implemented differentiable volumetric neural rendering to compute 2D GAN objectives from multi-view normal maps.

**Metamorphic Testing Framework for Deep Learning Models** | *Python, PyTest, Flask, HTML, CSS, JS* **Jul. 2022**
- Created a GUI based Web App to test the robustness of Deep Learning models under metamorphic transformations.
- The app works with all major deep learning frameworks and with many different input modalities like image, audio etc.
- Utilized Flask, Python, PyTest and Hypothesis for the back-end and HTML, CSS and JavaScript for the front-end.

**Conditional Speech Separation with Transformers** | *Python, PyTorch, Librosa, VScode, Wandb* **Mar. 2022**
- Developed a target speaker extraction system from monaural mixed-speech audio using transformer neural networks.
- Utilized LSTM and 1D CNN for encoding the inputs and generative adversarial objectives to further refine the outputs.
- Used Python and PyTorch for neural networks, VSCode for IDE and Librosa for audio mixing and transformations.

**Semi-Supervised Representation Learning using Group Loss** | *Python, PyTorch, PyCharm* **Mar. 2021**
- Designed a semi-supervised image classification algorithm using group loss to consider intra-batch embedding similarity.
- Improved image label guessing and label propagation using group loss based deep metric learning.
- Used Python and PyTorch for implementation and used MixMatch paper from Google Research as baseline.

**Text Independent Writer Identification from Handwritten Document Images** | *MATLAB* **Apr. 2017**
- Developed a GUI based stand alone app to identify writers of hand written document images.
- Utilized SIFT and SURF features along with Extreme Learning Machine (ELM) to compute handwriting similarity.
- Used MATLAB Image Processing and Computer Vision Toolboxes for core logic and GUIDE tool for UI development.

## Technical Skills

**Programming Languages**: Python, C#, C++, Java, C, HTML/CSS, JavaScript
**Technologies/Frameworks**: PyTorch, LangChain, FastAPI, FLASK, Git, .Net, Streamlit
**Developer Tools**: PyCharm, VS Code, Visual Studio, Docker, MATLAB, Wandb
**Topics**: Deep Learning, Computer Vision, 3D Reconstruction, Generative AI, LLMs, REST APIs