

SOUMICK CHATTERJEE

Machine Learning Researcher

✉ contact@soumick.com 📧 Immermannstraße 16, 39108 Magdeburg, Germany
📧 soumick 🌐 soumickmj 📄 Soumick-Chatterjee 🇩🇪 QllatFkAAAAJ

🌐 www.soumick.com 🐦 @soumick1993
📞 0000-0001-7594-1188

ABOUT ME

DOB: 18-Jan-1993

Gender: Male

Born in the city of joy Kolkata, India, currently I'm on the verge of finishing my PhD in Magdeburg, Germany. My main research field is machine learning, to be precise, deep learning, and its applications in the field of medical imaging. The focus of my thesis is to deal with artefacts in MRI - undersampled reconstruction and retrospective motion correction. I'm working on other deep learning projects: vessel segmentation, anomaly detection, tumour classification, etc. One major concern with deep learning models is their black-box nature. I'm trying to address that problem - building trust in such models with the help of interpretability, explainability, and uncertainty quantification.

Research is not only my profession but also my passion. I like to solve real-world problems with the help of artificial intelligence. I love my current research topics related to the applications of deep learning in medical imaging, as I believe these might contribute to saving some patient's life, even in the smallest magnitude in the long run. I'm really enthusiastic about physics as this is the study of the universe and would love to apply my skills of artificial intelligence in that field.

I like working in academia for two main reasons: I like teaching - helping students to prepare for the future workforce and try to motivate them to pursue careers in research, and I'm a supporter of open science - any research I'm doing can be made available publicly without restrictions - to be able to have a more considerable impact in the research community. During my current position, I have supervised several Master's students for their theses and research projects. Apart from research, I love listening to music, going out for photography, and cooking. I'm very enthusiastic about Italian music, food and culture. I care about various causes, such as racial profiling, gender inequality and climate change.

EXPERIENCE

Research Scholar

Otto von Guericke University Magdeburg

📅 January 2018 - Ongoing 📍 Magdeburg, Germany

- Affiliations:
 - Data and Knowledge Engineering Group (DKE), Institute of Technical and Business Information Systems (ITI), Faculty of Computer Science (FIN)
 - Department of Biomedical Magnetic Resonance (BMMR), Institute of Physics (IfP), Faculty of Natural Science (FNW)
- Scholar at International Graduate School MEMoRIAL, funded by the European Structural and Investment Funds (ESF), project title: Use of prior knowledge for interventional MRI (M1.4)

Research Associate

Infymax Solutions Pvt. Ltd.

📅 July 2017 - Nov 2017 📍 Kolkata, India

- Worked on Machine Learning & IOT based research projects, using technologies: Python, Matlab, OpenCV, Raspberry Pi, Arduino etc.
- Projects: Chatbot, Patient monitoring system

Co-Founder & Chief Software Architect

Supernova Techlink

📅 Dec 2011 - June 2017 📍 Kolkata, India

- Started just by selling a complete software solution to a hospital, Supernova Techlink is now engaged in developing various software solutions for hospitals, schools, colleges, hotels, restaurants and much more. Also provides Web Designing, Web Hosting & related services serving clients both home and abroad.

EDUCATION

Ph.D. in Computer Science

Otto von Guericke University Magdeburg

📅 Jan 2018 - Ongoing (~May 2022)

Thesis title (preliminary): *Dealing with Artefacts in MRI using Deep Learning*

M.Sc. in Computer Science

St. Xavier's College, Kolkata

📅 Aug 2015 - May 2017

Bachelor in Computer Application

Punjab Technical University

📅 Sept 2010 - Nov 2013

CERTIFICATIONS

Italian B1 (CEFR)

UNCert I, Sprachenzentrum, Otto von Guericke University Magdeburg




📅 2021

Microsoft Specialist: Server Virtualization with Windows Server Hyper-V and System Center

Microsoft, Exam Code: 74-409

- Supervised facial recognition project using Deep Learning.
- Led a team of 10, developing applications in platforms like .NET, Java, Xamarin, etc.
- Since August 2015, after joining M.Sc. served the duties on a part-time basis.

ACHIEVEMENTS

-  **MOOD Challenge (MICCAI 2021)**
Member of the 2nd runner-up team for sample-level anomaly detection in brain MRIs
-  **CHAOS Challenge (IEEE ISBI 2019)**
Member of the winning team of Task 1: liver segmentation from combined CT & MRI and runner-up of Task 4: segmentation of abdominal organs from combined CT & MRI
-  **Hult Prize 2017: Dubai Regional Finalists**
The Hult Prize is the world's largest student competition for social entrepreneurship organised jointly by Hult International Business School and the Clinton Global Initiative of Bill Clinton. *iRefugee*, our team of four, representing St. Xavier's College, Kolkata were qualified as Dubai Regional Finalists from India.

POSITIONS OF RESPONSIBILITY

Teaching and Supervising


Otto von Guericke University Magdeburg

 January 2019 – Ongoing  Magdeburg, Germany

Supervising several Master's students for their theses and research projects on various topics of deep learning. Conducted research seminars once every two semesters and mini-lecture series with practices as a part of machine learning lectures for medical systems engineering students - both on behalf of and under the supervision of Prof. Andreas Nürnberger.

Organiser

ISACT 2021

 March 2021 – September 2021

The International Summer School on Situation Awareness in Cognitive Technologies 2021 was held from September 6 to 11, 2021 in Magdeburg, Germany, in conjunction with the IEEE ICHMS 2021.

Organising Committee Member

eXabyte 2017

 Sept 2016 – May 2017

- Head of Photography & Videography
- Member of Developers' Board

eXabyte is the annual tech-fest organized by St. Xavier's College, Kolkata - Department of Computer Science.

Class Rep – BCA

Punjab Technical University, Institute: MNIMT Kolkata

 June 2010 – June 2013

Elected as the class representative of BCA in all the three years of undergraduate study. Served as the communication bridge between the administration and students.

 2014

MCTS: ASP.NET Application Development .net Framework 3.5

Microsoft, Exam Code: 70-562 & 70-536

 2012

MCTS: Windows Forms Application Development .net Framework 3.5

Microsoft, Exam Code: 70-505 & 70-536

 2012

PROFESSIONAL COURSES

ANIIT (Software Engineering)

NIIT Limited

 2009 – 2011

2 years complete industry endorsed training with hand-on experience of .NET Framework, Java and various other topics, followed by internship. Additionally, completed 2 CompTIA Certificate courses, 3 months each: PC Technician – A+ & Networking – N+

Oracle SQL 9i & PL/SQL 10g

Oracle University, NIIT College Street Centre

 2012

Six month training on Oracle SQL followed by PL/SQL

TECHNICAL SKILLS

Programming: Python, C, C++, C#, Java

Tools: PyTorch, ASP.NET, Arduino, Xamarin

Domains: Machine/Deep Learning, Computer Vision, Image Processing, Medical Imaging, Text Analysis

Others: Acquiring MRIs using Siemens Skyra 3T

LANGUAGES

English

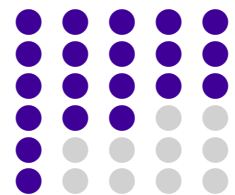
Bengali

Hindi

Italian

French

German



EXTRACURRICULAR ACTIVITIES

Cooking, Photography and Swimming are my favourite pass-times - my biggest stress busters.

PUBLICATIONS

📄 Journal Articles (as first author or co-first author)

- Chatterjee, S., Bajaj, H., Siddiquee, I. H., Subbarayappa, N. B., Simon, S., Shashidhar, S. B., ... Nürnberger, A. (in review). Micdir: Multi-scale inverse-consistent deformable image registration using unetmss with self-constructing graph latent. *arXiv preprint arXiv:2203.04317*. arXiv: 2203.04317
- Chatterjee, S., Prabhu, K., Pattadkal, M., Bortsova, G., Sarasaen, C., Dubost, F., ... Nürnberger, A. (in review). Ds6, deformation-aware semi-supervised learning: Application to small vessel segmentation with noisy training data. arXiv: 2006.10802
- Chatterjee, S., Prakash, S., De Luca, E., & Nürnberger, A. (in review). Flavours of convolution for aspect extraction and sentiment analysis.
- Chatterjee, S., Saad, F., Sarasaen, C., Ghosh, S., Khatun, R., Radeva, P., ... Nürnberger, A. (in review). Exploration of interpretability techniques for deep covid-19 classification using chest x-ray images. arXiv: 2006.02570
- Chatterjee, S., Sarasaen, C., Rose, G., Nürnberger, A., & Speck, O. (in review). Ddos-unet: Incorporating temporal information using dynamic dual-channel unet for enhancing super-resolution of dynamic mri. *arXiv preprint arXiv:2202.05355*. arXiv: 2202.05355
- Chatterjee, S., Sciarra, A., Dünwald, M., Talagini Ashoka, A. B., Cheepinahalli Vasudeva, M. G., Saravanan, S., ... Nürnberger, A. (in review). A comparative study of deep learning based sr-mri.
- Chatterjee, S., Sciarra, A., Dünwald, M., Tummala, P., Agrawal, S. K., Jauhari, A., ... Nürnberger, A. (in review). Strega: Unsupervised anomaly detection in brain mris using a compact context-encoding variational autoencoder. *arXiv preprint arXiv:2201.13271*. arXiv: 2201.13271
- Chatterjee, S., Yassin, H., Nürnberger, A., & Speck, O. (in review). Weakly-supervised segmentation using inherently-explainable classification models and their application to brain tumour classification.
- Ernst, P., Chatterjee, S., Rose, G., Speck, O., & Nürnberger, A. (in review). Sinogram upsampling using primal-dual unet for undersampled ct and radial mri reconstruction. *arXiv preprint arXiv:2112.13443*. arXiv: 2112.13443
- Chatterjee, S., Breitkopf, M., Sarasaen, C., Yassin, H., Rose, G., Nürnberger, A., & Speck, O. (2022). Reconresnet: Regularised residual learning for mr image reconstruction of undersampled cartesian and radial data. *Computers in Biology and Medicine*, 143, 105321. doi:10.1016/j.combiomed.2022.105321
- Chatterjee, S., Das, A., Mandal, C., Mukhopadhyay, B., Vipinraj, M., Shukla, A., ... Nürnberger, A. (2022). Torchsegeta: Framework for interpretability and explainability of image-based deep learning models. *Applied Sciences*, 12(4), 1834. doi:10.3390/app12041834
- Chatterjee, S., Nizamani, F. A., Nürnberger, A., & Speck, O. (2022). Classification of brain tumours in mr images using deep spatiotemporal models. *Scientific Reports*, 12(1), 1–11. doi:10.1038/s41598-022-05572-6
- Sarasaen, C., Chatterjee, S., Breitkopf, M., Rose, G., Nürnberger, A., & Speck, O. (2021). Fine-tuning deep learning model parameters for improved super-resolution of dynamic mri with prior-knowledge. *Artificial Intelligence in Medicine*, 121, 102196. doi:10.1016/j.artmed.2021.102196
- Chatterjee, S., Jose, P. G., & Datta, D. (2019). Text classification using svm enhanced by multithreading and cuda. *International Journal of Modern Education & Computer Science*, 11(1). doi:10.5815/ijmecs.2019.01.02
- Chatterjee, S., & Nath, A. (2017). Auto-explore the web-web crawler. *International Journal of Innovative Research in Computer and Communication Engineering*, 5(4), 6607–6618.

📄 Journal Articles (as a co-author)

- Sciarra, A., Chatterjee, S., Dünwald, M., Nürnberger, A., Speck, O., & Oeltze-Jafra, S. (in review). Automated ssim regression for detection and quantification of motion artifacts in brain mr images.
- Sciarra, A., Mattern, H., Yakupov, R., Chatterjee, S., Stucht, D., Oeltze-Jafra, S., ... Speck, O. (2022). Quantitative evaluation of prospective motion correction in healthy subjects at 7t mri. *Magnetic resonance in medicine*, 87(2), 646–657. doi:10.1002/mrm.28998
- Kavur, A. E., Chatterjee, S., Ernst, P., Speck, O., Nürnberger, A., Selver, M. A., et al. (2021). Chaos challenge-combined (ct-mr) healthy abdominal organ segmentation. *Medical Image Analysis*, 69, 101950. doi:10.1016/j.media.2020.101950
- Mukhopadhyay, A., Chatterjee, S., & Nath, A. (2018). Symmetric key encryption algorithm using spider web (esp) version-1. *International Journal of Latest Trends in Engineering and Technology*, 10(2), 342–346.
- Mukherjee, S., Jose, P. G., Chatterjee, S., & Basak, P. (2017). Duplicate file analyzer using n-layer hash and hash table. *International Research Journal of Computer Science*, 4(6), 24–30.
- Jose, P. G., Chatterjee, S., Patodia, M., Kabra, S., & Nath, A. (2016). Hash and salt based steganographic approach with modified lsb encoding. *International Journal of Innovative Research in Computer and Communication Engineering*, 4(6), 10599–10610.

Conference Full Articles (as first author or co-first author)

- Chatterjee, S., Sciarra, A., Dünwald, M., Mushunuri, R. V., Podishetti, R., Rao, R. N., ... Nürnberger, A. (2021). Shuffleunet: Super resolution of diffusion-weighted mris using deep learning. In *2021 29th european signal processing conference (eusipco)* (pp. 940–944). IEEE. doi:10.23919/EUSIPCO54536.2021.9615963
- Chatterjee, S., Jose, P. G., Basak, P., Athar, A., Aravind, B., Beed, R. S., & Biswas, R. (2016). Microcontroller based automated life savior-medisu. In *Computational science and engineering: Proceedings of the international conference on computational science and engineering* (p. 329). CRC Press.

Conference Full Articles (as a co-author)

- Iuso, D., Chatterjee, S., De Beenhouwer, J., & Sijbers, J. (2022). Analysis of the effectiveness of supervised neural networks for defect segmentation in additive manufactured parts. In *Spie developments in x-ray tomography xiv*. SPIE.
- Mitta, D., Chatterjee, S., Speck, O., & Nürnberger, A. (2021). Upgraded w-net with attention gates and its application in unsupervised 3d liver segmentation. In *Proceedings of the 10th international conference on pattern recognition applications and methods - icpram* (pp. 488–494). INSTICC. doi:10.5220/0010221504880494
- Sarasaen, C., Chatterjee, S., Breitkopf, M., Iuso, D., Rose, G., & Speck, O. (2019). Breathing deformation model-application to multi-resolution abdominal mri. In *2019 41st annual international conference of the ieee engineering in medicine and biology society (embc)* (pp. 2769–2772). IEEE. doi:10.1109/EMBC.2019.8857706
- Khatun, R., & Chatterjee, S. (2018). Machine learning approach for segmenting glands in colon histology images using local intensity and texture features. In *2018 ieee 8th international advance computing conference (iacc)* (pp. 314–320). IEEE. doi:10.1109/IADCC.2018.8692135

Conference Short Articles (as first author or co-first author)

- Chatterjee, S., Sarasaen, C., Rose, G., Nürnberger, A., & Speck, O. (2022). DDos-UNet: Incorporating temporal information using dynamic dual-channel UNet for enhancing super-resolution of dynamic MRI. In *Medical imaging with deep learning*. Retrieved from <https://openreview.net/forum?id=S7S6gPtBKU4>
- Sciarra, A., Chatterjee, S., Dünwald, M., Placidi, G., Nürnberger, A., Speck, O., & Oeltze-Jafra, S. (2022). Reference-less SSIM regression for detection and quantification of motion artefacts in brain MRIs. In *Medical imaging with deep learning*. Retrieved from <https://openreview.net/forum?id=24cqMfboXhH>
- Chatterjee, S., Breitkopf, M., Sarasaen, C., Yassin, H., Rose, G., Nürnberger, A., & Speck, O. (2021). Reconresnet: Regularised residual learning for mr image reconstruction of undersampled cartesian and radial data. In *Medical imaging with deep learning*. Retrieved from <https://openreview.net/forum?id=KNEKu-W4Avz>
- Chatterjee, S., Prabhu, K., Pattadkal, M., Bortsova, G., Sarasaen, C., Dubost, F., ... Nürnberger, A. (2021). Ds6, deformation-aware semi-supervised learning: Application to small vessel segmentation with noisy training data. In *Medical imaging with deep learning*. Retrieved from https://openreview.net/forum?id=2t0_AxD1otB
- Chatterjee, S., Sciarra, A., Dünwald, M., Oeltze-Jafra, S., Nürnberger, A., & Speck, O. (2020). Retrospective motion correction of mr images using prior-assisted deep learning. In *Medical imaging meets neurips 2020*.

Conference Short Articles (as a co-author)

- Ernst, P., Chatterjee, S., Rose, G., & Nürnberger, A. (2022). Primal-dual UNet for sparse view cone beam computed tomography volume reconstruction. In *Medical imaging with deep learning*. Retrieved from <https://openreview.net/forum?id=RVKcDeJ2fCi>

Conference Abstracts

- Chatterjee, S., Bajaj, H., Simon, S., Shashidhar, S., Speck, O., & Nürnberger, A. (2022). Multi-scale unet with self-constructing graph latent for deformable image registration. In *Joint annual meeting ismrm-esmrm 2022* (p. 5563).
- Chatterjee, S., Sciarra, A., Dünwald, M., Talagini Ashoka, A. B., Oeltze-Jafra, S., Speck, O., & Nürnberger, A. (2022). Uncertainty quantification for ground-truth free evaluation of deep learning reconstructions. In *Joint annual meeting ismrm-esmrm 2022* (p. 5631).
- Chatterjee, S., Sciarra, A., Dünwald, M., Tummalala, P., Agrawal, S., Jauhari, A., ... Nürnberger, A. (2022). Strega: Unsupervised anomaly detection in brain mris using compact context-encoding variational autoencoder. In *Joint annual meeting ismrm-esmrm 2022* (p. 5531).
- Chatterjee, S., Yassin, H., Dubost, F., Nürnberger, A., & Speck, O. (2022). Learning to segment brain tumours using an explainable classifier. In *Joint annual meeting ismrm-esmrm 2022* (p. 5592).

- Ernst, P., **Chatterjee**, S., Rose, G., Speck, O., & Nürnberger, A. (2022). Sinogram upsampling using primal-dual unet for undersampled ct and radial mri reconstruction. In *IEEE international symposium on biomedical imaging (isbi) 2022*.
 - Sarasaen, C., **Chatterjee**, S., Rose, G., Nürnberger, A., & Speck, O. (2022). Motion-robust dynamic abdominal mri using k-t grasp and dynamic dual-channel training of super-resolution u-net (ddos-unet). In *Joint annual meeting ismrm-esmrm 2022* (p. 2965).
 - **Chatterjee**, S., Bajaj, H., Shashidhar, S., Busnur Indushekar, S., Simon, S., Siddiquee, I., ... Nürnberger, A. (2021). A comparative study of deep learning based deformable image registration techniques. In *2021 ismrm & smrt annual meeting & exhibition* (p. 2436).
 - **Chatterjee**, S., Das, A., Mandal, C., Mukhopadhyay, B., Vipinraj Bhandari, M. B., Shukla, A., ... Nürnberger, A. (2021). Interpretability techniques for deep learning based segmentation models. In *2021 ismrm & smrt annual meeting & exhibition* (p. 2400).
 - **Chatterjee**, S., Sarasaen, C., Sciarra, A., Breitkopf, M., Oeltze-Jafra, S., Nürnberger, A., & Speck, O. (2021). Going beyond the image space: Undersampled mri reconstruction directly in the k-space using a complex valued residual neural network. In *2021 ismrm & smrt annual meeting & exhibition* (p. 1757).
 - **Chatterjee**, S., Sciarra, A., Dünwald, M., Agrawal, S., Tummala, P., Setlur, D., ... Nürnberger, A. (2021). Unsupervised reconstruction based anomaly detection using a variational auto encoder. In *2021 ismrm & smrt annual meeting & exhibition* (p. 2399).
 - Nath, V., Pizzolato, M., Palombo, M., Gyori, N., Schilling, K., Hansen, C., ... Hutter, J. (2021). Resolving to super resolution multi-dimensional diffusion imaging (super-mudi). In *2021 ismrm & smrt annual meeting & exhibition* (p. 0103).
 - Sarasaen, C., **Chatterjee**, S., Nürnberger, A., & Speck, O. (2021). Ddos: Dynamic dual-channel u-net for improving deep learning based super-resolution of abdominal dynamic mri. In *Esmrmb 2021 book of abstracts, published in magnetic resonance materials in physics, biology and medicine* (Vol. 34, S6.O3). doi:10.1007/s10334-021-00947-8
 - Sarasaen, C., **Chatterjee**, S., Saad, F., Breitkopf, M., Nürnberger, A., & Speck, O. (2021). Fine-tuning deep learning model parameters for improved super-resolution of dynamic mri with prior-knowledge. In *2021 ismrm & smrt annual meeting & exhibition* (p. 1778).
 - **Chatterjee**, S., Putti, P., Nürnberger, A., & Speck, O. (2020). Wavelet filtering of undersampled mri using trainable wavelets and cnn. In *Esmrmb 2020 book of abstracts, published in magnetic resonance materials in physics, biology and medicine* (p. L01.106). doi:10.1007/s10334-020-00876-y
 - Mattern, H., Sciarra, A., Dünwald, M., **Chatterjee**, S., Mueller, U., Oeltze-Jafra, S., & Speck, O. (2020). Contrast prediction-based regularization for iterative reconstructions (prosit). In *2020 ismrm & smrt annual meeting & exhibition* (p. 3462).
 - Mitta, D., **Chatterjee**, S., Speck, O., & Nürnberger, A. (2020). Unsupervised learning for abdominal mri segmentation using 3d attention w-net. In *2020 ismrm & smrt annual meeting & exhibition* (p. 3556).
 - Sarasaen, C., **Chatterjee**, S., Nürnberger, A., & Speck, O. (2020). Super resolution of dynamic mri using deep learning, enhanced by prior-knowledge. In *Esmrmb 2020 book of abstracts, published in magnetic resonance materials in physics, biology and medicine* (Vol. 33, S03.04). doi:10.1007/s10334-020-00874-0
 - Sciarra, A., **Chatterjee**, S., Dünwald, M., Speck, O., & Oeltze-Jafra, S. (2020). Evaluation of deep learning techniques for motion artifacts removal. In *2020 ismrm & smrt annual meeting & exhibition* (p. 3370).
 - Sciarra, A., Dünwald, M., **Chatterjee**, S., Speck, O., & Oeltze-Jafra, S. (2020). Classification of motion corrupted brain mr images using deep learning techniques. In *Esmrmb 2020 book of abstracts, published in magnetic resonance materials in physics, biology and medicine* (Vol. 33, S03.09). doi:10.1007/s10334-020-00874-0
 - **Chatterjee**, S., Breitkopf, M., Sarasaen, C., Rose, G., Nürnberger, A., & Speck, O. (2019a). A deep learning approach for reconstruction of undersampled cartesian and radial data. In *Esmrmb congress 2019*.
 - **Chatterjee**, S., Breitkopf, M., Sarasaen, C., Rose, G., Nürnberger, A., & Speck, O. (2019b). Comparison between the usage of same and different variable density undersampling patterns for deep learning based mri reconstruction. In *4th image-guided interventions conference (igic)*.
 - Sarasaen, C., **Chatterjee**, S., Breitkopf, M., Rose, G., & Speck, O. (2019). Generating breathing deformation model from low resolution 4d mri. In *4th image-guided interventions conference (igic)*.
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