

Deepankar Nankani, PhD

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I am a dedicated Data Scientist with over 9 years of experience, I specialize in designing and deploying cutting-edge ML models and data-driven solutions in the healthcare and technology sectors. I have successfully led diverse projects, significantly improving model performance and revenue generation. I am committed to leveraging my technical acumen and collaborative skills to deliver impactful solutions and advance organizational goals.

EXPERIENCE

Data Scientist (2 Years)

Eli Lilly and Company

June 2022 – Present

Bengaluru, Karnataka, India

- Developed data ingestion pipeline for internal data annotation framework using AWS.
- Created an internal chatbot (Lilly Unified Collaborator Assistant) for Lilly workforce automation and information dissemination using Microsoft Azure Cognitive Services. It provides information about company policies, procedures, sending emails, applying for leaves, scheduling meetings, blocking calendars, and creating incidents on ServiceNow. Exposed through an API for integration with various applications.
- Developed deep learning based sleep detection algorithms using accelerometer, Polysomnography and electroencephalogram data for atopic dermatitis and chronic pain population. Also extracted gait specific features and analyzed the correlation between physical activity and pain on a numerical rating scale for same population.
- Developed a Drug Hunter Digital Twin CoPilot for chemists, enabling it to suggest chemical compounds by analyzing features extracted from SMILES (chemical compound structures). This involved extensive model exploration, feature selection, normalization techniques, and parameter tuning to significantly enhance the model's F1 score. The tool was deployed in a live design environment to provide real-time inferences for chemists.
- Built a GUI framework that automates relationship extraction between digital biomarker features and patient-reported outcomes.
- Developed an Anomaly Detection framework using a joint learning framework that employs reinforcement learning, enhancing business use case evaluations.
- Led a team to develop a digital health platform providing a comprehensive health overview for patients.
- Developed a voice-assisted chatbot interface with ChatGPT backend and OpenAI's Whisper API.

Data Scientist (3 Months)

Jio Platforms Limited

March 2022 – June 2022

Hyderabad, Telangana, India

- Developed Text-to-Speech Systems: Implemented and enhanced the Tacotron architecture, a sequence-to-sequence model designed for converting text to natural-sounding speech.
- Model Training and Optimization: Conducted training on large-scale speech datasets, fine-tuned hyperparameters, and optimized the model for improved performance and reduced latency.
- Voice Quality Improvement: Applied advanced techniques such as attention mechanisms and post-processing methods to refine speech synthesis quality and ensure coherent and expressive audio outputs.
- Neural Machine Translation (NMT) Projects: Utilized Fairseq, a Facebook AI Research sequence-to-sequence learning toolkit, for developing state-of-the-art NMT models.
- Custom Model Implementation: Designed custom architectures and trained models for various translation tasks, including low-resource languages and domain-specific applications.
- Performance Enhancement: Applied techniques like data augmentation, model ensemble, and fine-tuning to enhance translation accuracy and efficiency. Implemented both transformer and convolutional models as part of end-to-end translation systems.

Research Scholar (4 Years)

IIT Guwahati

Sept. 2017 – Oct. 2022

Guwahati, Assam, India

- Deep Learning Models for Cardiac Abnormality Detection from ECG Signals: An Interpretability Perspective
- Addressed contamination by low-frequency noise (baseline wander) by utilizing Variational Mode Decomposition.
- Detected heartbeats (R-peaks) from ECG signals using Fractal Based Mathematical Morphological Operators.
- Developed a classifier to detect supraventricular ectopic beats, ventricular ectopic beats, and normal beats from single-lead ECGs. Augmented the beats for imbalance correction using a conditional Generative Adversarial Networks. Interpreted the model predictions using a Penalty Induced Prototype-based eXplainable Residual Neural Network.
- For single channel ECG, Detected ventricular arrhythmia using ResNet and interpreted results using Guided Back-propagation, Gradient Class Activation Maps, and Guided Gradient Class Activation Maps.
- For single channel ECG, detected atrial fibrillation using CNN, Attentive CNN, ResNet, and Transformer Neural Network, incorporating interpretability through attention mechanisms.

- Performed multi-channel ECG classification using ResNet, combined with demographic and heartbeat features, leading to Channel Specific Dynamic-CNN for improved performance and interpreted using Attention Mechanism.
- These methods aimed to enhance automated pre-screening for cardiovascular diseases and improve clinical decision support by providing transparent and trustworthy model explanations.

Junior Research Fellow (2 Years)

IIT Guwahati

July 2015 – Aug. 2017

Guwahati, Assam, India

- Seismic signal enhancement using stochastic resonance
- Applied stochastic resonance in seismology to improve the quality of seismic data using Ensemble Empirical Mode Decomposition (variant of SR) and improved Signal to noise ratio.
- Estimation of Petrophysical Properties from Seismic Attributes and Well logs using Machine Learning approaches. (ONGC Sponsored Project)
- Developed an image classifier using a convolution-based residual neural network. Incorporated image augmentation and transfer learning for improved performance and robustness.
- Developed a speech-based digit recognition system that extracted cepstral coefficient features from the audio signal, generated codebook using Linde-Buzo-Gray Algorithm, and predicted using Hidden Markov Model. The prediction was translated using an inbuilt feature of Visual Studio Code.

RESEARCH INTERESTS

Signal Processing (EEG, ECG, Accelerometer, PPG), Machine Learning, Deep Learning, Interpretability and Explainability in Neural Networks, AI in Biomedical Signals, Seismology, Stochastic Resonance

TECHNICAL SKILLS

Languages: Python, C/C++, R, MATLAB

Frameworks: Keras, Tensorflow, Pytorch, FastAPI, Theano, Neon

Cloud Services: AWS Lambda, Glue, S3. Azure Cognitive Services, BOT Service, LUIS, QnA Maker, GCP

Developer Tools: Git, Docker, VS Code, PyCharm, Audacity

MD3 Libraries: RDkit, MNE, Chemprop, Deepchem

EDUCATION

Indian Institute of Technology Guwahati

Doctor of Philosophy in Computer Science and Engineering

Assam, India

Sep. 2017 – Oct. 2022

Indian Institute of Technology Guwahati

Master of Technology in Computer Science and Engineering

Assam, India

July 2015 – Aug. 2017

Jaipur Engineering College and Research Centre Foundation

Bachelor of Technology in Electronics and Communication Engineering (Honours)

Rajasthan, India

Aug. 2011 – May 2015

Senior Secondary, Cambridge Court High School

Central Board of Secondary Education

Rajasthan, India

Aug. 2010 – May 2011

JOURNAL PUBLICATIONS

- Utkarsh Gupta and Naveen Paluru and **Deepankar Nankani** and Kanchan Kulkarni and Navchetan Awasthi. “A Comprehensive Review on Efficient Artificial Intelligence Models for Classification of Abnormal Cardiac Rhythms using Electrocardiograms.” Heliyon (2024).
- Deepankar Nankani and Rashmi Dutta Baruah, “PIPxResNet: Penalty Induced Prototype-Based eXplainable Residual Neural Network for Heartbeat Classification”, In Neural Computing and Applications, Springer. (Under Review)
- Deepankar Nankani and Rashmi Dutta Baruah, “Posthoc Interpretability Techniques for Explaining Ventricular Arrhythmia Prediction using Residual Neural Network”, In Neural Computing and Applications, Springer. (Under Review)
- Deepankar Nankani and Rashmi Dutta Baruah, “Feature Fused Multichannel ECG Classification using Channel Specific Dynamic CNN for Detecting and Interpreting Cardiac Abnormalities”, In Special Issue: Classification of Multilead ECGs, Physiological Measurement. (Under Review)

CONFERENCE PUBLICATIONS

- Deepankar Nankani, and Rashmi Dutta Baruah. “Atrial fibrillation classification and prediction explanation using transformer neural network.” In 2022 International Joint Conference on Neural Networks, pp. 01-08. IEEE, 2022.
- Deepankar Nankani, Parabattina Bhagath, Rashmi Dutta Baruah, and Pradip K. Das. “R-Peak Detection from ECG Signals Using Fractal Based Mathematical Morphological Operators.” In IEEE Region 10 Conference, 2021.
- Deepankar Nankani and Rashmi Dutta Baruah. “Ventricular Arrhythmia Classification and Interpretation Using Residual Neural Network with Guided Backpropagation.” In IEEE Region 10 Conference, 2021.
- Deepankar Nankani, Shivam Maurya, and Rashmi Dutta Baruah. “Model Compression Techniques for Atrial Fibrillation Detection on Mobile Devices.” In International Conference on Pattern Recognition and Machine Intelligence, Springer, 2021.
- Prithviraj Kanaujia, Pallabi Saikia, and **Deepankar Nankani**. “Restoring Face Occluded Images Using GAN Based Inpainting with Perceptual and Contextual Losses.” In International Conference on Pattern Recognition and Machine Intelligence, Springer, 2021.
- Deepankar Nankani and Rashmi Dutta Baruah. “Incorporating Demographic and Heartbeat Features with Multi-channel ECG for Cardiac Abnormality Detection using Parallel CNN and GAP Network.” In IEEE Computing in Cardiology 2021.
- Deepankar Nankani, Pallabi Saikia, Rashmi Dutta Baruah. “Automatic Concurrent Arrhythmia Classification using Deep Residual Neural Networks.” In IEEE Computing in Cardiology 2020.
- Deepankar Nankani and Rashmi Dutta Baruah. “Investigating Deep Convolution Conditional GANs for Electrocardiogram Generation.” In IEEE International Joint Conference on Neural Networks, pp. 1-8., 2020.
- Deepankar Nankani and Rashmi Dutta Baruah. “Effective Removal of Baseline Wander from ECG Signals: A Comparative Study.” In International Conference on Machine Learning, Image Processing, Network Security and Data Sciences, pp. 310-324. Springer, Singapore, 2020.
- Deepankar Nankani and Rashmi Dutta Baruah. “An End-to-End framework for automatic detection of Atrial Fibrillation using Deep Residual Learning.” In IEEE Region 10 Conference, pp. 690-695, 2019.
- Pallabi Saikia, **Deepankar Nankani**, and Rashmi Dutta Baruah. “Seismic Signal Interpretation for Reservoir Facies Classification.” In International Conference on Pattern Recognition and Machine Intelligence, pp. 409-417. Springer, 2019.
- Pallabi Saikia, **Deepankar Nankani**, and Rashmi Dutta Baruah. “Reservoir Facies Classification using Convolutional Neural Networks.” In 2019 IEEE Recent Advances in Geoscience and Remote Sensing: Technologies, Standards, and Applications (TENGARSS), pp. 34-38, 2019.

BOOK CHAPTERS

- Pallabi, Saikia, **Deepankar Nankani**, and Rashmi Dutta Baruah. “Machine learning paradigm for predicting reservoir property: an exploratory analysis.” Earth Observation Data Analytics Using Machine and Deep Learning: Modern Tools, Applications and Challenges (2023): 149-174.
- Deepankar Nankani and Rashmi Dutta Baruah. “Improved Diagnostic Performance of Arrhythmia Classification Using Conditional GAN Augmented Heartbeats.” In Springer Book entitled “Generative Adversarial Learning: Architectures and Applications”, 2022.

SCHOLARSHIP AND TRAVEL GRANTS RECEIVED

- MHRD Scholarship to pursue M.Tech. and Ph.D. at IIT Guwahati (2015-2020)
- PAN-IIT ONGC Scholarship for Ph.D. (2017-2021). Top-Up Fellowship.
- Registration Grant For IEEE International Joint Conference on Neural Networks 2020.
- IEEE CIS Travel Grant To Attend IEEE International Joint Conference on Neural Networks 2020.
- Registration waiver to attend Online Asian ML School and Asian Conference on ML 2021.
- IEEE CIS Travel Grant To Attend IEEE International Joint Conference on Neural Networks 2022.

ACHIEVEMENTS

- Winner at Tech@Lilly Hackathon
- Runner up at Lilly Innovation Challenge
- Selected to attend Google Research Graduate Symposium from 7th - 10th April 2021.
- Selected to attend ACM Summer School on Algorithmic and Theoretical Aspects of Machine Learning at IIIT Bangalore co-sponsored by Microsoft Research India from 10 to 28 June 2019.
- Second Prize in Oral Presentation at Research Conclave 2019, IIT Guwahati.

PROFESSIONAL COMMUNITY SERVICE

- Reviewer at IEEE-GCON 2022, IEEE-INTERCON 2021, AIMV 2021, MIND 2022, MIND 2024, INDICON 2021
- Reviewer at ML4H 2021. (Earlier a NeurIPS workshop.)
- Reviewer at Journals: Evolving Systems (Springer), NCAA, Neurocomputing

COURSERA CERTIFICATIONS

- Elastic Google Cloud Infrastructure: Scaling and Automation, Jun 2020. (WTE3JXL47KAL)
- Essential Google Cloud Infrastructure: Core Services, May 2020. (YBB5QJV8QXCN)
- Essential Google Cloud Infrastructure: Foundation, May 2020. (QF6T9EQEC326)
- Google Cloud Platform Fundamentals: Core Infrastructure, May 2020. (S8EB5KEXLGUK)
- Build a Data Science Web App with Streamlit and Python, May 2020. (NRLH6NXHAVJH)