Chahat Raj

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✉ craj@gmu.edu
🏠 chahatraj.github.io

RESEARCH INTERESTS

Social Computing, Human-Centered Computing, Fairness, Explainability, Deep Learning

EDUCATION

- **George Mason University** — Virginia, United States
  Doctor of Philosophy, Computer Science — *Aug. 2022 – Present*

- **Delhi Technological University** — Delhi, India
  Master of Technology, Information Systems (Research Track) — *Aug. 2019 – Aug. 2021*
  Thesis: Deep Neural Networks towards Multimodal Information Credibility Assessment

- **Indira Gandhi Delhi Technical University for Women** — Delhi, India
  Bachelor of Technology, Computer Science and Engineering — *Aug. 2015 – May 2019*

EXPERIENCE

- **University of Technology Sydney** — Sydney, Australia
  Visiting Scholar — *Jun. 2021 - Jul. 2022*
  - Designed & implemented neural network models for the detection of web information pollution, including cyberbullying, hate speech, and offensive speech, in multimodal data.
  - Conducted a comprehensive review of the state-of-the-art literature on vertigo diagnosis & performed over 150 machine-learning experiments to determine crucial medical tests for efficient diagnosis of spontaneous vertigo.
  - Contributed to the development of a diversity-inclusive curriculum for Australian aboriginal communities, incorporating AI and ML technologies into their lifestyle through a review of relevant scientific literature.
  - Investigated the relationship between disaster relief fundraising & social media KPIs by examining key hypotheses & analyzing users' perceptions towards multimedia posts in collaboration with the Australian Red Cross Society.
  - Conducted exploratory data analysis & sentiment analysis on Red Cross donation data during the Australian bushfire period, studied the impact of social media activity on donation behavior, and identified practical implications for promoting responsible fundraising practices among social media users.

- **Delhi Technological University** — Delhi, India
  Graduate Researcher — *Aug. 2019 - Jul. 2022*
  - Designed & implemented frameworks for detecting antisocial content online, utilizing deep neural networks & a range of machine learning algorithms, including supervised, semi-supervised, & unsupervised methods, for identifying fake news, rumors, misinformation, disinformation, infodemic, death hoaxes, fake videos & clickbait.
  - Acquired real-world datasets for misinformation analysis, including the COronaVirus Infodemic Dataset, the Fake News Video Dataset, and a questionnaire-based survey for evaluating the impact of infodemic.

- **Indian Institute of Management Raipur** — Chhattisgarh, India
  Remote Researcher — *May 2021 - Aug. 2021*
  - Utilized neural networks for predicting stock market and cryptocurrency prices, conducted analysis of financial market behavior, and evaluated the causal relationship between market trends and societal events.
  - Improved the accuracy of real-time multivariate time-series predictions for Bitcoin returns by optimizing the Taylor series approximation and copula methods.
  - Proposed a novel Long Short-Term Memory (LSTM) autoencoder model with False Nearest Neighbor regularization, capable of identifying social determinants contributing to fluctuations in Bitcoin prices.

- **Centre for Railway Information Systems (CRIS)** — Delhi, India
  Information Security Intern — *May 2018 - Aug. 2018*
  - Conducted security management and threat detection for Northern-Indian railways, including organizational defense, detection of malicious activities, analysis of logs, assessment of vulnerabilities, and generation of patches, using Cisco's Security Information and Event Management (SIEM) system.

- **Indira Gandhi Delhi Technical University for Women** — Delhi, India
  Research Intern — *Aug. 2017 - Dec. 2017*
  - Discovered previously unknown (zero-day) vulnerabilities on popular social networking applications such as Facebook, Instagram, and Telegram.

Publications

- **Chahat Raj** and Priyanka Meel. "People Lie, Actions Don't! Modeling Infodemic Proliferation Predictors among Social Media Users." *Technology in Society 2022, 68, 101930.* (Impact Factor: **7.82**)

- **Chahat Raj** and Priyanka Meel. "ARCNN Framework for Multimodal Infodemic Detection." *Neural Networks 2021, 146, 36-68.* (Impact Factor: **9.657**)

- **Chahat Raj** and Priyanka Meel. "ConvNet Frameworks for Multimodal Fake News Detection." *Applied Intelligence 2021, 1-17.* (Impact Factor: **5.086**)

- **Chahat Raj** and Priyanka Meel. "Microblogs Deception Detection using BERT and Multiscale CNNs." *IEEE GCAT 2021*

- **Chahat Raj** and Priyanka Meel. "Is Dynamic Rumor Detection on Social Media Viable? An Unsupervised Perspective." *2021. Arxiv*

- **Chahat Raj** and Priyanka Meel. "A Review of Web Infodemic Analysis and Detection Trends across Multi-modalities using Deep Neural Networks." *2021. Arxiv*

- **Chahat Raj** and Mihir P Mehta. "MediaEval 2020: An Ensemble-based Multimodal Approach for Coronavirus and 5G Conspiracy Tweet Detection." *MediaEval, CEUR Workshop Proceedings 2020*

- **Chahat Raj** and Priyanka Meel. "Fake News on Multiple Online Social Networks." *ICPCCAI 2020, 1-8.*

- **Chahat Raj**, Ayush Agarwal, Gnana Bharathy, Bhuva Narayan and Mukesh Prasad. "Cyberbullying Detection: Hybrid Models Based on Machine Learning and Natural Language Processing Techniques." *Electronics 2021, 10(22), 2810.* (Impact Factor: **2.397**)

- Vivek Velivela, **Chahat Raj**, Mahendra Samarawickrama and Mukesh Prasad. "The Effectiveness of Social Media Engagement Strategy on Disaster Fundraising." *2022.* (ISCRAM 2022)

- Varad Kabade, Ritika Hooda, **Chahat Raj**, Zainab Awan, Allison Young, Miriam Welgampola and Mukesh Prasad. "Machine Learning Techniques for Differential Diagnosis of Vertigo and Dizziness: A Review." *Sensors 2021, 21(22), 7565.* (Impact Factor: **3.576**)

- Chao Wang, Allison Young, **Chahat Raj**, Andrew Bradshaw, Sally Rosengren, Zeljka Calic, Gnana Bharathy and Mukesh Prasad. "Diagnosis of Recurrent Spontaneous Vertigo using Machine Learning Techniques." *2022.* (Under Review)

- Yohei Nii, **Chahat Raj**, Muhammad Salman Tiwana, Mahendra Samarawickrama and Mukesh Prasad. "Understanding Social Media Engagement in Response to Disaster Fundraising Attempts during Australian Bushfires." *ICIVC 2022*

- **Chahat Raj** and Manojit Chattopadhyay. "Bitcoin Price Prediction using LSTM Autoencoder Regularized by False Nearest Neighbor Loss." *2021.*

Teaching Experience

- **Graduate Teaching Assistant** — GMU, Virginia
  CS112 Introduction to Python Programming — Aug. 2022 – Present

- **Graduate Teaching Assistant** — DTU, Delhi
  ISY5301 Artificial Intelligence — Aug. 2019 – May 2021

- **Professional Tutor** — Delhi
  Tutored 300+ high school students — Apr. 2015 – Mar. 2022

Professional Service

- **Reviewer**
  Social Network Analysis and Mining (Springer), CGRN (UIUC), IJICC, JCMS, ASTES, Arts in Society

Awards and Achievements

- **Research Excellence Award 2022**: Received *Commendable Research Award* and a cash prize of INR 50,000 by DTU, Delhi, for the research done as a part of graduate thesis and its publication in *Applied Intelligence (APIN)*

- **Graduate Scholarship**: Received government scholarship from *AICTE* of INR 2,97,600 during the academic years 2019-2021 for qualifying GATE exam

Talks and Presentations

- **Cyberbully Monitoring**: ML4AU Research Showcase Event 2021, Sydney, Australia
- **Microblogs Deception Detection using BERT and Multiscale CNNs**: GCAT 2021, Bangalore, India
- **Cyber Security and Online Safety**: Motilal Nehru College, Delhi University, Delhi, India
- **Fake News: Coronavirus and 5G Conspiracy Task**: MediaEval 2020
- **Fake News on Multiple Online Social Networks**: ICPCCAI 2020, Jaipur, India

Selected Projects [codes]

- **TruePixel**: Novel R-CNN to detect image forgery using RPN, ROI pooling, Bilinear pooling, RGB & Noise Roi layers
- **SimonSays**: A Novel LSTM-CNN framework for speaker identification on self-curated dataset of 1300 audios
- **ToonGAN**: Cartoon Face to Human Face Translation using Generative Adversarial Network with Semantic Loss
- **AI-Spy**: Collected an infodemic dataset of 200 videos to perform rule & frame-based visual fake news detection
- **EMO-280**: A deep CNN to perform fine-grained emotion classification on AarogyaSetu data by Transfer learning
- **FakeTalk**: Sentiment Analysis on Twitter Infodemic with TextBlob, Affin; Misinformation Topic Modeling with LDA
- **WhoAmI**: A residual network for image-based human reidentification for biometric devices on self curated data
- **Touristics**: Mined TripAdvisor data and analyzed customer preferences in tourism and hospitality during COVID-19
- **Vehicle Tracker**: Device to detect road-violation using Raspberry Pi, GPS, Accelerometer, Ultrasonic sensor, camera
- **CryptoResume**: Decentralized Blockchain to resist frauds, data leakage, support accreditation for resume validation
- **RecruitQuery**: A low-cost solution to GitHub recruiters built using front-end layer over GitHub API, Re, Pygments

Relevant Coursework

Graduate Coursework

- *Research in CS, Data Mining, Research Problem Formulation, Research Project (24-Credits), Artificial Intelligence, Machine Learning and Applications, Image Analysis, Linear Algebra and Probability, High Performance Computing*

Undergraduate Coursework

- *Natural Language Processing, Artificial Intelligence, Data Warehousing & Data Mining, Cloud Computing, Big Data Analytics, Theory of Computation*

Skills and Technologies

- **Languages**: Python, R, MATLAB
- **Libraries**: TensorFlow, PyTorch, Keras, scikit-learn, nltk, spaCy, numpy
- **Softwares**: Minitab, SPSS, NVivo, Tableau, PowerBi, Office
- **Certifications**: Neural Networks and Deep Learning [Coursera], Deep Learning Fundamentals [IBM], Deep Learning with Tensorflow [IBM], Accelerated Deep Learning with GPUs [IBM], Machine Learning with Python [IBM], Data Visualization with Python [IBM], Data Visualization with R [IBM]

Non-academic Interests

Poetry, Blog Writing, Travel, Photography, Football, Art