Janmajay Singh

CONTACT INFORMATION

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RESEARCH INTERESTS

My research focuses on developing novel computational and statistical methods for problems in biology and medicine. I have mostly worked at the intersection of predictive, causal and mixture models and conducted research in multiple biomedical modalities (Omics, EMR and ECG). In addition, I have also worked in the recommendation and NLP domains. My projects have featured in **JMIR Medical Informatics**, **UAI** and **RecSys**.

EDUCATION

SRM University, Chennai, Tamil Nadu, India

Bachelors in Technology, Computer Science and Engineering (July 2013 - June 2017)
- CGPA: 9.33/10

Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

Special Student, Electrical Engineering and Computer Science (September 2015 - May 2016)

RELEVANT WORK EXPERIENCE

Fujifilm Corp. - R&D HQ, Kaisei, Kanagawa, Japan

Researcher - Computational Biology   **November, 2020 - Present**
Part of the Liquid Biopsy team at the Imaging Technology Center. Primary responsibilities include predictive model design and development for cancer prediction from blood DNA samples. Secondary responsibilities include algorithm design to reduce noise from DNA sequencing process. Proposed noise reduction algorithm successfully reduced measurement noise by 57% compared to targeted 10%, substantially improving the project workflow.

Fuji Xerox Co., Ltd. - R&D HQ, Yokohama, Kanagawa, Japan

Researcher - Predictive Models   **September, 2018 - October 2020**
Responsibilities included researching long-term predictions in sequential recommender models and interpretability. Also worked on modeling missing patterns in observation health record data from the ICU, and designed algorithms which enabled early diagnosis of diseases.

Visiting Scholar - Affective Computing   **September, 2017 - July, 2018**
Worked on sentiment analysis models and their interpretability using NLP and reinforcement learning respectively. Also learned about orchestration frameworks for IoT devices.

Voonik Technologies Pvt. Ltd. - R&D, Bangalore, Karnataka, India

Research Intern   **December, 2016 - June 2017**
Worked on building a real-time recommendation system from scratch, primarily focusing on latency minimization and state-of-the-art algorithm reproduction. Successfully completed a system compatible with limited hardware, employing a graph-based algorithm and a Neo4j database. The project was successfully deployed for a user-base of 10,000 users.

ACADEMIC PROJECTS

Massachusetts Institute of Technology - CSAIL

Student Project   **March, 2016 - June 2016**
Worked on a research project under Prof. P.H. Winston. Framed a doctor-patient conversation such that it may be used in a AGI system called "Genesis". Experiments were conducted to explore the system's feasibility in a clinical decision support setting for real time diagnosis. Conclusions

drawn included confirming the system's feasibility for said task, with the limitation of a lack of medical-specific lexicon. The system's lexicon was expanded, showing improved inductive abilities.

SRM University - Dept. of Computer Science

Project Mecura   **May, 2014 - May 2015**

Initiated a project for developing a Electronic Medical Record-keeping System for the university hospital. Coordinated a team of 8 members to successfully design a website and back-end system for storing patient health record information for easy access. Learned full-stack development, privacy challenges in healthcare data and leadership skills.

PUBLICATIONS   **Janmajay Singh**, Masahiro Sato and Tomoko Ohkuma. 2021. On Missingness Features in Machine Learning Models for Critical Care: Observational Study. JMIR Medical Informatics (*JMI '21*).

Janmajay Singh, Kentaro Oshiro, Raghava Krishnan, Masahiro Sato, Tomoko Ohkuma, and Noriji Kato. "Utilizing Informative Missingness for Early Prediction of Sepsis." In 2019 Computing in Cardiology (CinC), pp. 1-4. IEEE, 2019.

Sato, Masahiro, **Janmajay Singh**, Sho Takemori, and Qian Zhang. "Causality-Aware Neighborhood Methods for Recommender Systems." In European Conference on Information Retrieval, pp. 603-618. Springer, Cham, 2021.

Krishnan, Raghava, **Janmajay Singh**, Masahiro Sato, Qian Zhang, and Tomoko Ohkuma. "Incorporating Wide Context Information for Deep Knowledge Tracing using Attentional Bi-interaction." (2021).

Sato, Masahiro, **Janmajay Singh**, Sho Takemori, Takashi Sonoda, Qian Zhang, and Tomoko Ohkuma. "Modeling user exposure with recommendation influence." In Proceedings of the 35th Annual ACM Symposium on Applied Computing, pp. 1461-1464. 2020.

Sato, Masahiro, **Janmajay Singh**, Sho Takemori, Takashi Sonoda, Qian Zhang, and Tomoko Ohkuma. "Uplift-based evaluation and optimization of recommenders." In Proceedings of the 13th ACM Conference on Recommender Systems, pp. 296-304. 2019.

Sato, Masahiro, Sho Takemori, **Janmajay Singh**, and Tomoko Ohkuma. "Unbiased learning for the causal effect of recommendation." In Fourteenth ACM Conference on Recommender Systems, pp. 378-387. 2020.

Assaraf, David, Jeremy Levy, **Janmajay Singh**, Armand Chocron, and Joachim A. Behar. "Classification of 12-lead ECGs Using Digital Biomarkers and Representation Learning." In 2020 Computing in Cardiology, pp. 1-4. IEEE, 2020.

Takemori, Sho, Masahiro Sato, Takashi Sonoda, **Janmajay Singh**, and Tomoko Ohkuma. "Submodular Bandit Problem Under Multiple Constraints." In Conference on Uncertainty in Artificial Intelligence, pp. 191-200. PMLR, 2020.

Behar, Joachim A., Chengyu Liu, Kevin Kotzen, Kenta Tsutsui, Valentina DA Corino, **Janmajay Singh**, Marco AF Pimentel et al. "Remote health diagnosis and monitoring in the time of COVID-19." Physiological measurement 41, no. 10 (2020): 10TR01.

UNDER REVIEW   **Janmajay Singh**, Naoko Yamaguchi, Masahiro Sato and Kengo Goto. ReMarker: A REINFORCE-based BioMarker Selection Method for Early Cancer Diagnosis.

PATENTS   **Janmajay Singh**, Masahiro Sato, and Takashi Sonoda. "State estimation apparatus and non-

transitory computer readable medium." U.S. Patent Application 16/829,574, filed March 11, 2021.

Masahiro Sato, **Janmajay Singh**, Sho Takemori, Takashi Sonoda, Qian Zhang and Tomoko Ohkuma. "Information processing apparatus and non-transitory computer readable medium." U.S. Patent Application 16/776,508, filed March 4, 2021.

AWARDS

Fujifilm Technical Report Award: 2021 recipient, usually given to 5 of ∼300 members of the R&D group.

Fuji Xerox Outstanding Research Award: Twice (2020 and 2021) recipient, usually given to 10 of ∼300 members of the R&D group.

Physionet Challenge 2019 Finished 5th of 104 teams internationally by building a highly accurate model for early diagnosis of sepsis in a population of ICU patients.

OTHER EDUCATION

MITx - Statistics and Data Science MicroMasters, edx.org

An online Masters program hosted by MIT. The courses fulfill the MIT IDSS PhD credit requirements.

- 14.310Fx: Data Analysis in Social Science
- 6.431x: Probability
- 6.86x: Machine Learning with Python
- 18.6501x: Fundamentals of Statistics

COMPUTER SKILLS

- Languages: Python, R, Java, C++, bash scripting.
- Deep Learning Frameworks: PyTorch, Tensorflow, Keras
- Databases and Tools: MySQL, PostgreSQL, MongoDB, Neo4j, Kafka