

# MANAN SAXENA

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## EDUCATION

**Pennsylvania State University**, University Park, PA

Expected May 2024

Master of Science in Informatics, GPA: 3.92/4.0

**Delhi Technological University (Formerly DCE)**, India

June 2020

Bachelors of Technology in Software Engineering, GPA: 3.7/4.0

## EXPERIENCE

**Research Assistant**, *Pennsylvania State University, University Park, PA*

May 2023 - Present

**Supervisor:** Prof. Justin Silverman

**Key Skills:** Statistical Modelling, Time-series Analysis, Machine Learning

- Developed scalable Bayesian inference for a class of generalized multivariate time series models called Generalized Dynamic Linear Models (GDLMs) with applications in econometrics and life sciences.
- Employed matrix calculus for closed-form MAP Estimation updates in GDLMs for optimizing computational efficiency which involved extensive usage of Boost and Eigen package in C++.
- Engineered a high-performance header library for parallelized Metropolis Particle Filter in C++ for GDLM's posterior computation and integrated it with R via the Rcpp package for enhanced accessibility. This achieves a **32x** faster performance than basic R implementation.

**Software Development Engineer**, *Tumme.com*

Sep 2021 - June 2022

**Key Skills:** Fullstack Development, Project Management

- Managed end-to-end software development lifecycle for key projects, ensuring **zero-fault** live deployments and optimal cross-platform performance.
- Directed a project centered on UI/UX refinement, driven by direct customer interactions and feedback collection, leading to tailored improvements that enhanced user experience and satisfaction.
- Worked with Python and WebApp2 framework integrated with cloud-based Google App Engine for the backend and JavaScript with jQuery for the frontend.

**Visiting Researcher**, *Trinity College Dublin, Ireland*

June 2019 - July 2021

**Supervisors:** Prof. Ciaran Simms, Prof. Aljosa Smolic, Richard Blythman

**Key Skills:** Deep Learning, Computer Vision, Biomechanical Analysis

- Developed proof-of-concept for injury prediction and rehabilitation in collision sports videos involving evaluation of 3D pose estimation, object tracking, and instance segmentation algorithms.
- Inferred on novel rugby tackle dataset and compared to industry-standard motion capture systems like VICON.
- Built an automated pipeline for camera calibration and face blurring for acquiring new human motion video datasets.
- Coordinated and conducted studies with coaches and physiotherapists for the development of a prototype and a Minimum Viable Product.
- Paper[Link]: "Assessment of Deep Learning Pose Estimates for Sports Collision Tracking" **published in** *Journal of Sports Science*, 2022.

## PROJECTS

**Classification of Breast Cancer Histology Images through distilling knowledge**

- Implemented a light CNN model for high-resolution breast cancer histology image classification, utilizing knowledge distillation techniques and attention maps. Leveraged ResNet 50 as a teacher model to improve the performance of a lighter ResNet 8 model, boosting its accuracy by **5%**.
- Paper[Link] : **Published in** *Lecture Notes in Networks and Systems, vol 164. Springer*, Singapore.

**Skeleton-Based View Invariant Deep Features for Human Activity Recognition**

- Introduced novel view-invariant skeletal features to describe spatial-temporal characteristics of human motion. Achieved a **2%** accuracy improvement over existing state-of-the-art models on the NUCLA dataset through the application of transfer learning and dynamic image techniques.
- Paper[Link] : **Presented at** *IEEE BigMM Conference*, Singapore, Sept 11-13, 2019.

**Music Lyrics Analysis and Q&A System**

- Developed an interactive system for analyzing and responding to queries about music lyrics. Utilized LangChain framework, combined with ChatGPT for natural language processing and YouTube API for lyric extraction from music videos.

## SKILLS

**Programming Languages**

C++, Python, R, SQL, Javascript, HTML, CSS, Stan

**Web Development Tools**

Flexbox, Bootstrap, Node.js, Express.js, MongoDB, Heroku, Webapp2, Google App Engine, jQuery, Docker, Git, Linux, Microsoft Office

**Data Science and AI Tools**

PyTorch, Tensorflow, Keras, LangChain, OpenCV, Pandas, Scikit-learn, Scipy, Matplotlib, Numpy