SHANTANU GHOSH

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OBJECTIVE *To secure a PhD position in the area of Machine Learning/Deep Learning with a focus of Causal Inference and Computer Vision*

RESEARCH INTERESTS *Deep Generative Modeling, Causal Inference, Deep Learning, Computer Vision*

EDUCATION

University of Florida, Gainesville, FL, USA
Master of Science, Computer and Information Sciences
Advisors: Dr. Kevin Butler, Dr. Mattia Prosperi
Aug, 2019 - May, 2021 **GPA: 3.85/4**

West Bengal University of Technology, West Bengal, India
Bachelor of Technology from Institute of Engineering and Management
Computer Science and Engineering
Aug, 2008 - June, 2012 **GPA: 8.38/10**

PUBLICATION

1. *Deep Propensity Network using a Sparse Autoencoder for Estimation of Treatment Effects* - **Shantanu Ghosh**, Jiang Bian, Yi Guo, Mattia Prosperi. Journal of the American Medical Informatics Association (JAMIA)
2. *Causal AI with Real World Data: Do Statins Protect From Alzheimer's Disease Onset?* - Mattia Prosperi, **Shantanu Ghosh**, Zhaoyi Chen, Marco Salemi, Tianchen Lyu, Jiang Bian. Journal of Artificial Intelligence in Medicine **(Under review)**
3. *Propensity Score Synthetic Augmentation Matching using Generative Adversarial Networks (PSSAM-GAN)* - **Shantanu Ghosh**, Jiang Bian, Mattia Prosperi. Journal of Computer Methods and Programs in Bio-medicine Update **(Under review)**

RESEARCH EXPERIENCE

Florida Institute for Cybersecurity Research (FICS), Gainesville, FL, USA
Graduate Research Assistant ***Jan 2021 - Present***
Advisors: Dr. Kevin Butler, Dr. Mattia Prosperi
Working in the intersection of Causal Inference and Deep Generative Models under the supervision of Dr. Kevin Butler and co-advised by Dr. Mattia Prosperi of DISL, UF.

Data Intelligence Systems Lab (DISL), Gainesville, FL, USA
Graduate Student Assistant ***Feb 2020 - Dec 2020***
Advisor: Dr. Mattia Prosperi, Dr. Jiang Bian, Dr. Yi Guo
• Currently working on to improve PSSAM-GAN framework by incorporating Adverserial Autoencoder and InfoGAN.

• Developed Deep Propensity Network - Sparse Autoencoder(**DPN-SA**) - a sparse auto encoder based neural network model to calculate propensity score, outperformed logistic regression and LASSO by **36-63%**, and DCN-PD (baseline models) by **6-10%** across all datasets. Paper is accepted at ***Journal of the American Medical Informatics Association (JAMIA)***. [**Code**]

• Using Pytorch, reproduced the model DCN-PD proposed in the paper [**Paper**](*ICML 2017 - Workshop on Principled Approaches to Deep Learning*), that has been utilized in the research study whether usage of Statins is useful toward the onset of Alzheimer disease. Paper is under review at ***Journal of Artificial Intelligence in Medicine***. [**Code**]

• Developed Propensity Score Synthetic Augmentation Matching using Generative Adversarial Networks (**PSSAM-GAN**) - an algorithm to generate synthetic treated sam-

ples to remove imbalance within a observational dataset for Propensity score matching (PSM). The model improved the performance by **38%** and **5%** over DCN-PD and TARNET(baseline models) respectively. Paper is under review at ***Journal of Computer Methods and Programs in Bio-medicine Update***. [**Code**]

Multimedia Communications and Networking Laboratory (MCN), Gainesville, FL, USA
Independent Researcher ***Feb 2020 - May 2020***
Advisor: Dr. Dapeng (Oliver) Wu
Developed a Deep Convolutional Multitask Neural Network(**MTL-TCNN**) to classify textures under the supervision of Dr Prof Dapeng Oliver Wu of the Department of Electrical & Computer Engineering in the University of Florida. [**Report**] [**Code**]

PROFESSIONAL EXPERIENCE

Lexmark International India Pvt Ltd, Kolkata, West Bengal, India
Software Engineering Professional II ***Oct 2016 - July 2019***
Developed the ISP component of the product Publishing Platform for Retail(PPR) with active participation in 2 major releases. Also, worked on Lexmark Digital Media Platform, a multi-tenant enterprise video content management platform hosted in Amazon Web Services.

Cognizant Technology Solutions India Pvt Ltd, Kolkata, West Bengal, India
Associate, Projects ***March 2013 - September 2016***
Developed WCF web services in the Contract First Approach to provide secure communication between different In-house application using Service Oriented Architecture (SOA), C# .Net 4.5, Oracle Client 11g. Trained C# to new recruits in Cognizant Academy.

COURSE PROJECTS

Dataset augmentation using InfoGAN and CGAN **Oct 2020 - present**
***Deep Learning for Computer Graphics,* University of Florida, FL, USA**

Implemented dataset augmentation on MNIST and CIFAR10 using InfoGAN and ConditionalGAN to improve the classification accuracy of an image classifier.
[**Report**] [**Code**]

- **Technology/Tools:** Python, Pytorch, Sckit-Learn

Deep Colorization with CNN **Oct 2020 - Nov 2020**
***Deep Learning for Computer Graphics,* University of Florida, FL, USA**

Designed a deep CNN which is trained to color grayscale face images with one channel and size 128 x 128 per image to produce a full-colored image with 3 channels. We transform the RGB image to LAB colorspace (Lightness, A, and B) which is easier to extract the lightness channel from the image which will be then fed into CNN to predict the color values of the image using regression. [**Report**] [**Code**]

- **Technology/Tools:** Python, Pytorch, Sckit-Learn

Hashtag Counter **March 2020 - April 2020**
Advanced Data Structures, University of Florida, FL, USA

Implemented a system to find the most popular hashtags that appear on social media using Max Fibonacci Heap data structure and a max priority structure to find out the most popular hashtags. Tested the code with **1M** hashtags. [**Report**] [**Code**]

- **Technology/Tools:** Java

Classification of Handwritten Characters **Oct 2019 - Dec 2019**
***Fundamentals of Machine Learning,* University of Florida, FL, USA**

Inspired by the famous architecture **"Lenet-5"**, developed a deep CNN model to classify Handwritten Characters using a custom Handwritten Character Dataset prepared

by Prof Alina Zare by utilizing the Adam Optimizer, Batch Normalization and dropout and achieved a classification accuracy of **97.3%** on a customised data set prepared by Prof Zare [**Code**]

- **Technology/Tools:** Python, Pytorch, Sckit-learn

Implementation of P2P network **Nov 2019 - Dec 2019**
***Computer Networks,* University of Florida, FL, USA**

Created a peer-to-peer(P2P) network for file downloading. Developed components – peer and file owner. The file owner has a file, and breaks the file into chunks of 100KB. Each peer connects to the file owner to download some chunks with the help of two threads, one acting as a server that uploads the local chunks to another peer (referred to as upload neighbor), and the other acting as a client that downloads chunks from a third peer (referred to as download neighbor). Tested the code with max **5** peers and max file size of **13.3 MB**. [**Code**]

- **Technology/Tools:** Socket Programming, Java

TECHNICAL SKILLS

Languages : Python, C++, C, Java, C#/.Net, Javascript/Typescript
Database : MySQL, Oracle 9i/10g, MS SQL Server, DB2
Web Development : Angular, Node.js, WCF
Machine Learning : TensorFlow, PyTorch, Scikit-learn

GRADUATE COURSES

• Fundamentals of Machine Learning • Distributed Operating Systems • Computer Networks • Mathematics for Intelligent Systems • Advanced Data Structures • Machine Learning • Deep Learning Computer Graphics • Fundamentals of Probability • Advanced Machine Learning • Analysis of Algorithms • Numerical Optimization

ACHIEVEMENTS.

• Recipient of **National Scholarship** Award from **Central Government Human Resource Development Department of Higher Education, India** for excellent result in Higher Secondary Examination in the state of West Bengal, India.
• Topped with **1%** of all candidates appeared in **West Bengal Joint Entrance Examination** in 2008.
• Received **Star Employee** award in Q4, 2013 and Q4, 2015 in Cognizant Technology Solutions.
• Received **Achievement Award** of 4500 USD during the admission of graduate studies in the University of Florida in Fall 2019.
• Received **Research Assistantship** under the supervision of Prof Kevin Butler in FICS Lab, starting from Jan 2021 in the domain of explainaible AI.