Jayjay Jeongjin **Park**

MS in Computational Science & Engineering
Interdisciplinary Machine Learning Researcher | Computational Model Developer

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I am a computational scientist with a focus on developing novel theory-informed computational models. I am passionate in using my expertise to solve complex problems from a wide range of domains, from engineering to finance.

Education

Present - Fall 2022 **Georgia Institute of Technology**
Master of Science in Computational Science & Engineering | GPA : 3.55/4.0
Thesis : On Generalization Ability of Neural Ordinary Differential Equation for Chaotic Systems
Advisor : Dr. Nisha Chandramoorthy

Spring 2022 - Fall 2018 **Purdue University - West Lafayette**
Bachelor of Science in Industrial Management - Computer Science | GPA : 3.71/4.0

Technical Skills

Programming	Python (AI&ML), SQL (AI&ML), Git, C, HTML, Java, Julia, R, Javascript
Frameworks	Cuda, Pytorch, Tensorflow, SciPy, Pandas, Matplotlib, Numpy, Numba
Data Analysis	Excel Solver, Google Cloud Platform (BigQuery), Minitab, NVivo
Research-related	LaTeX, Mixed Method, Systematic Review, Thematic Analysis, User Interview

Publications

2021 L. Bosman, **J. Park**, and N. Hernandez, "If I can measure it, I can improve it : Teaching design & innovation experiences to undergraduate students", VentureWell Conference (virtual).

2019 A. Toombs, M. Davidge, **J. Park**, G. Sirko, M. LaPeter, "Algorithmically-Generated Communities : A Case Study", the 22nd ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW), Austin, Texas, USA, https://doi.org/10.1145/3311957.3359457

2019 A. Toombs, M. Davidge, **J. Park**, G. Sirko, M. LaPeter, "Algorithmically-Generated Communities : A Case Study", 2019 Purdue Summer Undergraduate Research Conference, West Lafayette, Indiana, USA.

2019 L. Bosman, **J. Park**, D. Young, K. Arakawa, R. Keilman, C. Rummage, "Aligning Student Design Projects to Government Design Challenges through Collaboration with the Virtual Student Federal Service Program", 2019 Purdue Spring Undergraduate Research Conference, West Lafayette, Indiana, USA.

Working Paper

2023 **J.Park**, N.Chandramoorthy, "Advanced Algorithm for Neural Ordinary Differential Equation for Learning Dynamics" Target Conference : International Conference of Machine Learning 2024

2023 **J.Park**, N.Chandramoorthy, "Chaotic Neural Stochastic Differential Equation for Cryptocurrency Price Prediction"

Research Experience

Present *April 2023* **Graduate Research Assistant | D2A2 Lab, CSE Dept, Georgia Institute of Technology**

- Conducting experiments and theoretical analysis on Neural ODE's performance in learning complex system
- Researching algorithms to improve Neural SDE's learning of non-ergodic systems
- Developed open source package for novel Neural ODE training algorithm which utilizes Cuda framework, including multi-processing and gpu kernel functions
  github.com/https://github.com/ni-sha-c/GDEExpts/tree/fifth_copy
- The developed package improves prediction performance by using properties of dynamical system
- Generated 3D animations that explain both Lorenz System's orbit and ergodic properties which played a pivotal role in obtaining conclusive results
- Presented a talk on "Can a Neural ODE Learn a Chaotic System ?" to researchers at Georgia Tech

Neural Ordinary Differential Equation | Pytorch | Numba | Cuda | Dynamical Systems | Chaos Theory | Ergodicity | Deep Learning Theory

July 2021 – March 2021

Research Intern | Human Centered Artificial Intelligence Lab, University of Seoul, South Korea

- Conducted a systematic review on papers that designed or developed chatbots to assist chronic patients starting from applying PRISMA guidelines (5 different databases) to finding content for the result and discussion section
- Co-authored a paper on a recommendation algorithm for deep-learning education YouTube videos by writing both the literature review and design implication section of the paper that was submitted to the ACM Intelligent User Interfaces (IUI) conference

Systematic Review | Human-Computer Interaction | Recommendation Algorithm

May 2021 – May 2020

Research Assistant | Starship (Food Delivery Robot) Project, Computer Graphics Technology Dept, Purdue University

- Conducted thematic analysis for the qualitative data (text, image, video) crawled from the Reddit to research on the social acceptance of the food delivery robot
- Researched on existing literatures and drafting literature review for the paper

Human-Robot Interaction | Thematic Analysis | Literature Review

March 2021 – January 2019

Undergraduate Reserach Intern | iAgree Lab, Discovery Park Undergraduate Research, Purdue University

- Calculated the Pearson correlation coefficient of the themes created using NVivo with the applicant quantity to study government internship recruitment procedure
- Drafted introduction, method and result section of the paper under review for the 2022 American Society for Engineering Education

NVivo

August 2019 – June 2019

Undergraduate Reserach Intern & Co-author | Community-Computer Interaction Lab, Discovery Park Undergraduate Research, Purdue University

- Published a short paper on the 22nd ACM Conference on Computer Supported Cooperative Work (CSCW) in 2019
- Conducted a case-study on algorithmically generated groups from the website, the100.io that generates groups of 100 users based on their demographic data
- Implemented thematic analysis on the website's and groups' qualitative data and interviewed users

Thematic Analysis | Interview | Paper

Work Experience

October 2021 – August 2021

Student Staff, The 23rd International SIGASSET Conference on Computers and Accessibility, Virtual

- Provided support in conference preparation tasks, including verifying submitted materials and managing the Discord channel
- Coordinated registration for conference attendees

Excel | Discord

April 2020 – January 2020

Business Team Staff, Purdue Electric Racing, Purdue University

- Initiated branding process by creating a new prototype of website design, logo
- Gathered and analyzed the other team's sponsors list in order to reach out to our potential sponsor

Excel

September 2019 – April 2019

Academic Tutor for Student Athletes, Purdue University Athletics, Purdue University

- Tutored student athletes for MGMT 200 (Introductory to General Accounting)

Tutor | Accounting

May 2019 – January 2019

Virtual Intern, US Agency for International Development, Virtual Student Federal Service

- Designed a new prototype of the USAID's Development Experience Clearinghouse utilizing InVision for the concept design and Wix for the system construction
- Analyzed thousands of diplomatic documents in database from 1990 to 2010 through Postman (API) and Excel in a governmental design project initiated by the US Agency for International Development
- Visualized its database to increase usability of archived diplomatic documents

Excel | InVision | Postman

Projects

N-CATS, a Model for Cryptocurrency Price Prediction 10/2023 - 12/2023

CSE 6740, Georgia Institute of Technology github.com/https://github.com/jayjay-park/N-CATS.git
Devised an training algorithm inspired by recent finding on cryptocurrency market (that market is chaotic system). Created baseline model, LSTM, Neural ODE to predict cryptocurrency price. Proposed and implemented new model, Neural Chaotic Auto-correlation for Time Series, that learns both price history and market dynamics. N-CATS outperforms LSTM and Neural ODE in long term prediction.

LSTM | Neural Stochastic Differential Equation | Dynamics | Time-Series | Pytorch

TransRecG : Transformer-Based Recommendation System using GCN 2/2023 - 4/2023

CSE 6240, Georgia Institute of Technology
Created User-Movie-Attribute Knowledg eGraph from MovieLens1M dataset. With created Knowledge Graph Embedding, I implemented Graph Convolution Network and Neural Graph Collaborative Filtering for movie recommendation task

Recommendation System | GCN | Knowledge Graph | Neural Graph Collaborative Filtering | Pytorch

HICE : Hate Group Identification with Community Embeddings 8/2022 - 12/2022

CSE 8803 DSN, Georgia Institute of Technology
Led a group project which proposed new method to identify online hate group. Designed architecture of new classification model which detects hate groups on Reddit by employing different types of representation learning method. Conducted topci modeling on subreddit posts with Latent Dirichlet Allocation. Assisted with GraphSAGE embedding generation. Suggested new metric to identify hate group for ground truth generation.

Representation Learning | Latent Dirichlet Allocation | Classification | GraphSAGE

Deep Reinforcement Learning Project 1/2022 - 5/2022

Math Dept, Purdue University
Designing a deep reinforcement agent using RLax and Haiku libraries from DeepMind JAX Ecosystem under the supervision of Professor Guang Lin

Deep Reinforcement Learning | JAX

Forecasting Price of Cryptocurrency 11/2021 - 12/2021

MGMT 382, Purdue University
Led a project that developed a cryptocurrency price forecasting model by implementing ARIMA Model in SQL using BigQuery of Google Cloud Platform

ARIMA | SQL | Time-Series | Google Cloud Platform

Volunteer

July 2018 - January 2018 **Massachusetts General Hospital**
Discharged patients and assisted patients, doctors and staffs at Yawkey Building (Outpatient Department) and instructed incoming new volunteers

February 2017 - December 2016 **Volunteer Morocco**
Set and operated interim rural clinics at Agadir(Morocco) with Moroccan doctors. Measured blood glucose and blood pressure to perform basic medical diagnosis.

Awards

December 2020 **Jeonju ICT Innovation Artificial Intelligence Kaggle Competition**
Received scholarship and award for creating a supervised learning model that classified multiple types of poker hand with TensorFlow

Relevant Coursework & Certificates

Certificate Supervised Machine Learning (Stanford), Deep Learning (Jeonju ICT Innovation), Social Media Data Analytics (University of Washington)

Coursework Computational Data Analysis, Computational Foundation for Machine Learning, C-Programming, Computational Science and Engineering Algorithms, Data and Visual Analytics, Data Science for Social Network, Modeling and Simulation, Multivariable Calculus, Numerical Linear Algebra, Object-Oriented Programming

Reference

Dr. Nisha Chandramoorthy
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