Jayjay Jeongjin **Park**

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

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I'm a computational scientist specializing in developing innovative, theory-informed computational models. With a passion for solving complex problems, I apply my expertise across diverse domains, spanning 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 the Generalization Ability of Neural Ordinary Differential Equations 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, "Can Neural ODEs learn chaotic dynamics ?" Target Conference : SIAM Journal on Mathematics of Data Science 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 ODEs' performance in learning complex systems
- Researching algorithms to improve Neural SDEs' learning of non-ergodic systems
- Developed an open-source package for a novel Neural ODE training algorithm utilizing the CUDA framework, incorporating multiprocessing and GPU kernel functions
  github.com/https://github.com/ni-sha-c/GDEExpts/tree/fifth_copy
- The developed package enhances prediction performance by leveraging the inherent properties of dynamical systems
- Generated 3D animations that illustrate both the orbit and ergodic properties of the Lorenz System, 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

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 Tech | github.com/jayjay-park/N-CATS.git jayjay-park.github.io/single_NCATS

I devised a training algorithm inspired by recent findings on the cryptocurrency market, recognizing its chaotic nature. Initially, I created baseline models including LSTM and Neural ODE to predict cryptocurrency prices. Subsequently, I proposed and implemented a novel model, Neural Chaotic Auto-correlation for Time Series (N-CATS), designed to learn both price history and market dynamics. N-CATS demonstrated superior performance over LSTM and Neural ODE in long-term prediction accuracy.

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

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

CSE 6240, Georgia Tech | jayjay-park.github.io/single_TransRec

I created a User-Movie-Attribute Knowledge Graph using the MovieLens1M dataset. With the generated Knowledge Graph Embedding, I implemented both Graph Convolutional Networks (GCN) and Neural Graph Collaborative Filtering (NGCF) for the 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 Tech

I led a group project that introduced a novel method for identifying online hate groups. I designed the architecture of a new classification model aimed at detecting hate groups on Reddit, leveraging various representation learning methods. Additionally, I conducted topic modeling on subreddit posts using Latent Dirichlet Allocation and assisted in GraphSAGE embedding generation. Furthermore, I proposed a new metric for identifying hate groups to aid in ground truth generation.

Representation Learning | Latent Dirichlet Allocation | Classification | GraphSAGE

Deep Reinforcement Learning Project 1/2022 - 5/2022

Math Dept, Purdue University

I designed a deep reinforcement learning agent using the RLax and Haiku libraries from the 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

I led a project that involved developing a cryptocurrency price forecasting model. This was accomplished by implementing an ARIMA model directly in SQL using Google Cloud Platform's BigQuery.

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 Dynamical System (audit), 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

Assistant Professor, Georgia Institute of Technology

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