

TING-YU DAI

12113, Dessau Rd. Apt 14303, Austin, TX, 78754

(+1)5128319769 ◊ funnyengineer@utexas.edu ◊  FunnyEngineer ◊  Ting-Yu Dai

EDUCATION

Ph.D. Candidate in Sustainable System , <i>University of Texas at Austin</i> — Austin, TX Advisors: Prof. Dev Niyogi & Prof. Zoltan Nagy	2021 - Present
MSc in Computer-Aided Engineering , <i>National Taiwan University</i> — Taipei, Taiwan	2019 - 2021
BS in Civil Engineering , <i>National Chiao Tung University</i> — Hsinchu, Taiwan	2015 - 2019

RESEARCH INTERESTS

Climate Change, Air Quality, Urban Building Energy Modeling, Geospatial Data, Self-supervised Learning

SKILLS

Programming	Python, TypeScript, JavaScript, Dart (Flutter), C++, Java, MATLAB, C#
Machine learning framework	Pytorch, Tensorflow, Detectron2, Scikit-learn, AWS Lex, Darts
Software & Tools	AWS, Firebase, PostgreSQL, Unity, MySQL, MongoDB, Linux, Git, Docker, Tableau

RESEARCH EXPERIENCE

Representation Learning on Highly Fragmented Satellite Aerosol Imagery – *Remote Sensing, Generative modeling* Feb. 2024

[Submitted to ICLR 2024] Explore the potential of utilizing computer vision techniques by learning the representations of satellite AOD estimation as a highly fragmented image. Developed an autoencoder to reconstruct non-Gaussian fragmented imagery.

CityTFT: Temporal Fusion Transformer for Urban Building Energy Modeling – *Transformer, Energy* Oct. 2023
[NeurIPS 2023] Established a temporal fusion transformer to model urban energy demands as a surrogate model for traditional physic-based UBEM methods. CityTFT reached **40 times** faster to simulate compared to the physics-based model and **6 times** more accurately compared to classic RNN and transformers while predicting in an unseen climate dynamic. (F1 score of **99.98 %** while RMSE of loads of **13.57 kWh**.)

Analyzing the impact of COVID-19 on the electricity demand in Austin, TX using an ensemble-model based counterfactual and 400,000 smart meters – *Ensemble Model, Social Science, Building Energy* Dec. 2022
[Urban Computational Science] Applied a large-scale private smart meter electricity demand data from **the City of Austin**, combined with publicly available environmental data, and develops an ensemble regression model for long-term daily electricity demand prediction.

Generating High-Resolution PM2.5 using a Two-stage Machine Learning Approach with Low-Cost Air Quality Sensors and Satellite Observations – *Data Fusion, Air Quality, Remote Sensing* Dec. 2022
[AGU2022 Oral] Developed a two-stage machine learning method to create a **ground-level PM2.5 grid dataset** by calibrating LCS and using the calibrated PM2.5 to fuse with HRRR(Meteorological data) and AOD values. [REF]

Modelling high-resolution rainfall extremes in a changing climate – *Self-Attention, Rainfall Extremes* Apr. 2021
[MSc Thesis][EGU2021] Implemented an ML-based approach to bridge climate reanalysis data and local rainfall statistics and predicted future rainfall patterns based on future climate. [THESIS] [REF]

pyBL: Stochastic Rainfall Generator – *Stochastic Model, Statistics, Rainfall Extremes* Apr. 2021
[EGU2021] Developed an open-source Python package for stochastic rainfall modelling based upon the randomized Bartlett-Lewis (BL) rectangular pulse model to generate future rainfall for building strength design. [REF][CODE]

EXPERIENCE

NASA, Universities Space Research Association (USRA) Research Intern – machine learning, air quality, geospatial data	Huntsville, Alabama May. 2022 - Aug. 2022
---	--

- Working with the **NASA Marshall Space Flight Center** research team for a Citizen Science Project.
- Utilized PurpleAir sensor in San Francisco and Los Angeles and developed a machine learning model to calibrate the LCS measurements with the federal equivalent methods which **decrease the MSE from 6.38 to 0.11**.
- Designed a data fusion method to merge meteorology and AOD data into the ground-level PM2.5 concentration and generated an urban gridded PM2.5 dataset in both SF and LA area that contains **over 134 million data points**.

Rainbo

Software Engineer – TypeScript, React, GIS

Taipei, Taiwan

Oct. 2022 - Dec. 2022

- Worked with a nonprofit reinsurance company, **Micro**, to develop a **GIS-based visualization platform** in Latin American countries for disaster simulation, historical payout events, and a sales dashboard.
- Visualized the agricultural economic loss in Colombia, Guatemala, Mexico, and El Salvador.
- Cooperated with **multidisciplinary** people including the CEO, data analysts, and sales contacts.

DragonCloud.ai

Software Engineer, Intern – AWS, Unity, Chat bot

Saratoga, CA

May. 2020 - Feb. 2021

- Built a **serverless backend** by AWS tools comprising Lambda, S3, and Lex to behave the virtual teacher.
- Implemented a **CNN** to connect the facial mesh in Unity with a real teacher to provide a more realistic teaching experience.
- Diagnosed students' English accents by building a **GAN-based denoized model** to clean the input signal and to score similarity between pronunciations of input speech and native American accents.