

# Yiwan Chen

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## Education

**University of Michigan, Ann Arbor** DOCTOR OF PHILOSOPHY IN MATHEMATICS (GPA: 3.86)

2015-2021(Expected)

- Received Donald J. Lewis Fellowship

**University of Illinois, Urbana-Champaign** BACHELOR OF SCIENCE IN MATHEMATICS (GPA: 3.7)

2011-2015

- Graduated with H. Roy Brahana Prize (Most Exceptional Undergraduate Mathematics Career Award)
- Related course: An Introduction to Computer Science and Object-Oriented Programming using Java

## Skills

**Programming:** PYTHON, JULIA, MATLAB, JAVASCRIPT, JAVA, C++, HASKELL, SQL

**Language:** ENGLISH (ADVANCED), MANDARIN/CANTONESE(NATIVE LANGUAGE), JAPANESE (FLUENT), FRENCH (BASIC)

**Algorithms & Concepts:** SVD, REGRESSIONS, PCA, SVM, DECISION TREE, CNN, RSA ALGORITHM, ALGORITHM X

**Frameworks & Packages:** FLASK WITH DASH, TENSORFLOW, KERAS, GOOGLE CLOUD SERVICE, AWS, UNITY,

BLENDER, LINUX/UNIX, MYSQL, HADOOP

## Experience

**Machine Learning Engineer Intern** 1ST MICHIGAN REALTY LLC (BLOOMFIELD HILLS, MI)

Jun 2020 - Sep 2020

- Co-founded the Data Science department for a traditional real estate firm as a Data Scientist
- Built a data pipeline from scratch using Python and MySQL, connected and extracted batch data from Rets database through MLS server, simplified the process of manually collecting data by over 90%, combined over 45 GB data from multiple resources.
- Participated in **building a real-time web-based data visualization with real-time GIS portal** [www.1mrdata.com](http://www.1mrdata.com) from scratch using Dash and flask, providing comparison of any two characteristics of the housing market in the given areas
- Developed a new Python module that automatically corrects 95% of the corrupted data using **fuzzy matching algorithms**, save manual efforts by more than 70%
- Analyzed the turnover rate of house market of Novi by subdivision with ranking, trained **machine learning** model to forecast residential property price and predict probability of sales in Southeast Michigan, with cross-validated mean squared logarithmic error of 0.032

**CÖDE - Data Science Bootcamp** ERDŐS INSTITUTE(ONLINE)

May 2020

- Participated in an applied data science boot camp with a market-driven curriculum
- Studied data gathering techniques, practiced skills on **regressions, classifications, unsupervised learning** with reality data
- Collaborated with two group members in delivering presentation to an audience of more than 100. Presentation **praised highly by judges**

## Projects

**Pixel Art Math Worksheet generator - Open Source** PERSONAL PROJECTS IN PYTHON

Spring 2021

- Individually developed a Python web app using **flask**, which automatically converts any uploaded pixel artwork into a pixel art math work sheet
- Developed a pipeline that automatically converts categorize and **convert similar colors into the same closest color** that has an English name based on CSS's **webcolors** library, and label them by their English name
- Developed a module for generating a detailed instruction key for converting back the result of formulas back to the pixel art
- Cooperated with **local pixel artists and distributed it during a local library event**

**EECS 505: Computational Data Science and Machine Learning** PERSONAL PROJECTS IN JULIA

Fall 2020

- Studied **regression, unsupervised learning, clustering, deep nets, convolutional and recurrent neural networks**
- Conducted class project using **Julia** for polynomial regression models of search trends, discovered the seasonal pattern including control topic and gym registration topic.
- Conducted the class project rock-paper-scissor classifier, successfully matching 96.3% of the samples given.

**Root Insurance Challenge** GROUP PROJECT IN PYTHON

May 2020

- Participated in an applied data science boot camp with a market-driven curriculum
- Analyzed the data received from bidding market and recover 12.5% of the missing market data using **deep learning based matrix completion**.
- Optimized bidding strategy for an insurance company with static modeling and **reinforcement learning**, provided an optimal bidding strategy which theoretically saves the company's bidding expense by 12%

**Number Theoretic Random Walk** GROUP PROJECT IN C++

Fall 2013 - Spring 2015

- Explore Number-Theoretic Random Walks using Python and Mathematica, produced **Interactive Animations**
- Carried out **large scale parallel computation** of the random walks with cluster computer written in c++ using **fast fourier transform**, boosting the speed eight times the original program

**Dynamic Modeling of Ebola Transmission** GROUP PROJECT IN PYTHON

Feb 2015

- Constructed the stage-dependant mathematical model of Ebola transmission in Python based on the **SEIR model**
- Implemented an **intercity Markov Chain model** from scratch and simulated an outbreak, matching the real 30 days data with 72% accuracy

## Research

**Homogeneity result for general linear group**

Jan 2019-present

University of Michigan

- Research topic for interplay between number theory and representation theory
- Thesis Topic: Homogeneity for reductive  $p$ -adic groups theory in  $p$ -adic representation theory

**On the equality of Dedekind Sum and Inversion Polynomial**

Jun 2014 - Aug 2014

ICERM

- Dedekind sums were introduced to express the functional equation of the Dedekind eta function
- Explored the question of when Dedekind sums equal, i.e.  $s(a_1, b) = s(a_2, b)$ . Produced large scale **parallel computation** and visualizations

## Mentoring Experience

**Directed Reading Program Mentor**

Spring 2020 - Now

University of Michigan

- Directed a reading program cryptography with book **A Course in Number Theory and Cryptography** by Neal Koblitz
- Instructed a reading program on **Discrete Stochastic Processes and random walk** using own notes

**Log(M) Graduate Student Mentor**

Spring 2018, Fall 2019

University of Michigan

- Graduate Student Mentor on the research topic: **Growth rates of tent maps**, directed by Harrison Bray
- Co-instructed the project **Piercing d-intervals, d-convex sets, and other geometrical hypergraphs** with Shira Zerbib
- Performed large data calculations relating to the topic using **cluster computer** for both projects