Zhizhi Jing

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Education

MSc in Mathematics of Science and Engineering — *Munich, German*
Technical University of Munich — **01/04/2024–In progress**

- Main courses:
  Dynamical System, Combinatorial Optimization, Foundations in Data Analysis, Numerical Methods for Partial Differential Equations, etc.

Summer School — *Beijing, China*
Department of Mathematics, Peking University — **10/07/2023–04/08/2023**

- Main Courses:
  Emergent Phenomena in Mathematical Models for Biology and Medicine - Philip Maini (University of Oxford), Optimization theory on algorithm of machine learning - Martin Jaggi (EPFL), Deep Learning Theory - Zhiyuan Li (Stanford University)

Bachelor of Science in Applied Mathematics — *Rochester, NY, USA*
University of Rochester — **01/09/2019–30/05/2023**

- Main courses:
  Calculus IIA, Multidimensional Calculus, Linear Algebra W/Diff. Equ, Transition to Higher Math, Intro to Probability, Operations Research, Linear Algebra, Point Set Topology, Functions of Real Variable I, Numerical Analysis, Math Methods in Optics &Physics; Mechanics, Electricity & Magnetism, Waves and Modern Physics, Quantum Mechanics of Physical System; Data Structures & Algorithms; Intermediate Microeconomics, Economics of Sports

Working Experience

NLP Engineer — *Beijing, China*
GTCOM.Inc. — **08/2021–10/2021**

- *Participated in solving the task of identifying the relationships of different words in various sentences;*
- *Understood and rewrote the structure of Transformers in the Bidirectional Encoder Representations from Transformers (BERT);*
- *Responsible for the weekly progress report; organized the company's annual council; investigated of the BERT model for Chinese.*

Publication

The History of Neuromorphic Computing and its Application on Recognition Systems
Zhizhi Jing

- Accepted by the 3rd International Conference on Signal Processing and Machine Learning (CONF-SPML 2023). It will be published in the IOP Journal of Physics: Conference Series or Applied and Computational Engineering, and will be submitted to EI Compendex, Conference Proceedings Citation Index (CPCI), Crossref, DOAJ, Inspec, Scopus, Google Scholar, and other databases for indexing.

Projects

Relation extraction based on BERT (Bidirectional Encoder Representations from Transformers)

- This program is designed based on Transformers in BERT.
- With Transformers, this program is able to read the data (sentence) given, identify the main object of the sentence, and extract the relationship between objects and descriptions of main objects (such as hometown, gender, date of birth, etc.) I am currently working on the paper for this program.
- Language using: Python
- Label: Deep-Learning, NLP (Nature Language Processing)

Simulation of Matter Waves using Mathematica

- This program simulates the effect of matter waves.
- The wave function Psi is defined in this program to generate two sets of plots with different time constants. This program could visualize the effect of multiple waves with different or the same weight. And note that the weight of each wave function is described by a Gaussian distribution.
- Language using: Mathematica
- Label: Quantum Mechanics

Solving Finite Potential well problem using Mathematica

- This program uses Mathematica to solve the partial differential equation, especially for finite well problems. Note that in this program, the Schrödinger equation is divided into different intervals in order to get the eigenfunction.
- Language using: Mathematica
- Label: Quantum Mechanics

Street mapping program by Java

- Given the data set representing the roads and intersections in a specific geographic region, this program is able to plot a map of the data, provide the shortest path directions between any two arbitrary intersections using Dijkstra's algorithm, and be able to generate the minimum weight spanning tree for the entire map.
- Language using: Java
- Label: Graph Theory

Infix calculator by Java

- This program would read and write text from the user's keyboard input. Users could input the formula, and this program would give a result. This program uses the idea of RPN including infix and postfix. This calculator supports basic operands like (), *, +, sin, cos, and so on.
- Language using: Java

Seminars

Binary Stellar Mass Black Holes in AGN Disks as Possible LIGO Sources **Rochester, NY, USA**
Hui Li, Los Alamos National Laboratory **07/09/2022**

- This seminar talks about the formation of the heaviest binary black hole (BBH).
- Role: As a student, get involved with discussion.
- Gain:
  1.high-resolution 2D and 3D hydrodynamical and magnetohydrodynamic solutions to examine the physical processes that regulate BBH's Orbital evolution (especially the formation of BBH)
  2. The hierarchy of disk structures in BBH, including the circum-single disk (CSD) and the circum-binary disk (CBD).With Transformers, this program is able to read the data (sentence) given, identify the main object of the sentence, and extract the relationship between objects and descriptions of main objects (such as hometown, gender, date of birth, etc.) I am currently working on the paper for this program.

Seminar with Prof. Steve Gonek **Rochester, NY, USA**
Steve Gonek, Professor & Chair, Mathematics in University of Rochester **01/05/2022-01/08/2022**

- This seminar talks about some selected math papers. (Basically, the professor lead us to go through some papers and review their ideas including Hardy's Z – function, Turan's method, Fejér kernel , etc.
- Role: As a student involved in talk.
- Gain:
  How to write a math paper; Concepts from Analytic Number Theory.

Asymptotic stability for the sine-Gordon kink under odd perturbations via super symmetry **NY, USA**
Wilhelm Schlag, Phillips Professor of Mathematics, Department Chair, Yale University **30/11/2021**

- This seminar talks about the Kinks (Important examples of topological solitions in classical field theory.)
- Role: As a student involved in talk.
- Gain:
  1. Learned kinks studied by methods of complete integrability, such as the inverse scattering transform, especially the basic models known as phi^4
  2. Learned the recent asymptotic analysis with Jonas Luehrmann (TAMU) of the sine-Gordon evolution of odd data near the kink.

Homotopy classification of operator solutions of linear systems (Held by) **NY, USA**
Cihan Okay, Bilkent University **03/12/2021**

- This seminar talks about the Linear systems of equations over a finite field.
- Role: As a student involved in talk.
- Gain:
  1. How Linear systems of equations work in quantum information theory
  2. How the data of the linear system of equations can be expressed using a hypergraph and the operator solutions can be studied from a topological point of view by considering certain topological realizations of these hypergraphs.

Skills

Digital competence

- -Familiar with Python, JAVA, MATLAB or Mathematica, STATA, GNU Octave, Julia
- -Familiar with Packages including: Pandas, Tenserflow, Sklearn, NumPy, Torch, BERT, Brain2
- -Familiar with Operation System and Office Software
- -Packages: MS- PowerPoint, Word, Excel, Adobe Acrobat, SPSS;
- -Systems: MS-Windows XP/vista/7/Windows 10/Mac OS;

Languages

- Chinese: Mother tongues
- English: C1.
- Japanese: A1

Hobbies:

- Literature: Poetry, Prose (especially for ancient Chinese poetry or Modern poetry from 30s)
- Sports: Swimming
- Painting: Sketch, Watercolors.