

# Ziqian Zhong

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## Research Interests

I'm interested in understanding and improving language models. My current research aims to gain better understanding of mechanisms and limitations of large language models, in order to align or improve them.

## Education

**Candidate for B.S. in Computer Science and Mathematics** 2020/08 – present  
*Massachusetts Institute of Technology* Cambridge, MA  
GPA: 5.0/5.0  
Selected Coursework: Quantitative Methods for Natural Language Processing (A), Machine Learning (A), Fundamentals of Statistics (A), Advanced Data Structure (A+), Advanced Complexity Theory (A), Combinatorial Theory (A), Number Theory I (A), Computation Structures (A+), Elements of Software Construction (A+)

## Experiences

**Deep Learning Research @ MIT** 2022/11 – present  
*Supervised by Jacob Andreas, Max Tegmark* Cambridge, MA  
Focused on interpreting and understanding neural networks. Result in published papers.

**Deep Learning Research @ MIT** 2022/08 – 2023/06  
*Supervised by Neil Thompson* Cambridge, MA  
Conducted research to unveil connections between various properties of functions and learning dynamics. Responsible for developing training pipelines and collecting data.

**Theoretical Computer Science Research @ MIT** 2021/10 – 2022/05  
*Supervised by Virginia Vassilevska Williams* Cambridge, MA  
Discovered and published several new results in graph theory and combinatorics.

**Algo Developer Intern** 2023/05 – 2023/08  
*Hudson River Trading* New York, NY  
Conducted both market and algorithmic research. Project featured in intern spotlights [📄](#).

## Publications

First authors marked with \*. Theoretical CS papers have authors ordered alphabetically.

**The Clock and the Pizza: Two Stories in Mechanistic Explanation of Neural Networks** [📄](#) 2023/06  
*Ziqian Zhong\*, Ziming Liu\*, Max Tegmark, Jacob Andreas; NeurIPS 2023 (Oral)*

**Grokking as Compression: A Nonlinear Complexity Perspective** [📄](#) 2023/10  
*Ziming Liu\*, Ziqian Zhong\*, Max Tegmark; NeurIPS 2023 UniReps Workshop*

<b>On Problems Related to Unbounded SubsetSum: A Unified Combinatorial Approach</b> <a href="#">↗</a> <i>Mingyang Deng, Xiao Mao, Ziqian Zhong; SODA 2023</i>	2023/01
<b>New Lower Bounds and Upper Bounds for Listing Avoidable Vertices</b> <a href="#">↗</a> <i>Mingyang Deng, Virginia Vassilevska Williams, Ziqian Zhong; MFCS 2022</i>	2022/08
<b>New Additive Approximations for Shortest Paths and Cycles</b> <a href="#">↗</a> <i>Mingyang Deng, Yael Kirkpatrick, Victor Rong, Virginia Vassilevska Williams, Ziqian Zhong; ICALP 2022</i>	2022/07

## Talks

<b>New Approach for Unbounded SubsetSum</b> <i>SODA 2023</i>	2023/01 Florence, Italy
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## Selected Awards

<b>Gold Medal, Fourth Place</b> <i>International Olympiad in Informatics 2019</i> The most prestigious computer science olympiad for secondary school students. Gold medal and 4th place overall as a member of the China team.	2019/08
<b>Fourth Place</b> <i>Meta Hacker Cup 2023</i> International competitive programming contest. Fourth place out of 12k+ participants.	2023/12
<b>First Place</b> <i>ICPC North America Championship 2022</i> ICPC is an algorithmic programming contest for college students. As a member of the MIT ICPC team, secured first place by a large margin among top teams from 50 schools.	2022/05
<b>Honorable Mention</b> <i>Alibaba Global Mathematics Competition 2022</i> Ranked top 100 in the international mathematics competition with 50k+ participants.	2022/06
<b>Honorable Mention</b> <i>Putnam Mathematical Competition 2022</i> Ranked top 100 in the preeminent undergraduate mathematics competition.	2022/12
<b>Second Place</b> <i>Weblab 2022</i> Annual one-month web development hackathon in MIT. Second place among 120 teams.	2022/01

## Selected Projects

<b>CP Ideas</b> <a href="#">↗</a> <a href="https://fjzzq2002.github.io/cpideas/">https://fjzzq2002.github.io/cpideas/</a> A tool that generates competitive programming problems by fine-tuning GPT-3. Collected and cleaned data scrapped from various online judges.	2022/07
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