MACSS SUMMER INSTITUTE 2023

At a Glance

East Hall
530 Church

Prepared by
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ABOUT THE MACSS SCHOLARS PROGRAM

The MaCSS Scholars program is a small but vibrant community of Math, Computer Science, and Statistics majors at University of Michigan. Students enter the program as rising second-years or recent community college transfer students. The NSF-funded program (DUE-2221516) aims, specifically, to support students from low-income backgrounds through their major and beyond. Support includes scholarships (up to $10K/year), **an intellectually engaging intensive summer institute**, and much more. The program components all work toward the same goal: that all scholars complete their intended major, with competitive transcripts and resumes, giving them the ability to pursue their chosen professional or academic path post-graduation.

GOALS OF THE SUMMER INSTITUTE

- Build a rich, social-academic community
- Inspire , engage, and excite scholars with hands-on, novel, and challenging project-based experiences in their disciplines
- Increase sense of belonging at UM and discipline.
- Prepare scholars for key courses, including Linear Algebra (math), Probability (stats), and Discrete Mathematics (CS).

SUMMER 2023 HIGHLIGHTS

SCHOLARS ATTENDED

14

Out of a selected cohort of 16 students, 14 were able to attend the summer institute. We also accepted two "late admit" scholars who will attend in Summer 2024.

GUEST COLLOQUIA

13

A key feature of the summer institute was exposing scholars to diverse disciplinary perspectives. We were excited to offer 13 guest colloquia on a wide variety of topics over the four weeks.

NUMBER OF FIELDTRIPS

4

A key piece of the summer institute is building community. Wednesday afternoons were reserved for field trips! We went on a local hike, to the Detroit Institute of Arts, MCity, and Kayaking on the Huron River.

ABOUT THE 14 SCHOLARS

1   MATH MAJOR

3   DATA SCIENCE AND STATS MAJORS

2   COG. SCI MAJORS

8   COMP. SCI MAJORS

9   IN-STATE STUDENTS

7   TRANSFER STUDENTS

9   WOMEN

5   NON-TRADITIONAL STUDENTS (>22 YO)

KEY INSTITUTE ACTIVITIES

- Daily Puzzle
- Inquiry-Based Learning Course on Probability (2 weeks)
- Coding Lab (Matlab)
- Daily Guest Colloquia
- Student-led Projects (2 weeks)
- Mentor Mixer
- Dorm living and selected catered meals
- Weekly Field Trips
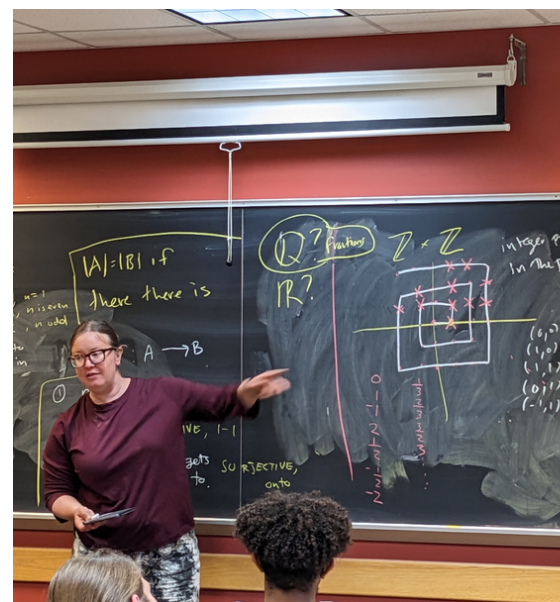
SCHOLAR HIGHLIGHT: ELENA F.

"I TRULY GAINED A SUPPORT SYSTEM WITH THE RELATIONSHIPS THAT I HAVE MADE WITH PEERS AND FACULTY ON CAMPUS."

Why did you choose U-M?
"Out of all the schools I was accepted to, U-M has the most unique, major-specific opportunities to ensure success in my career path. I wanted a big school with endless opportunities for me to build character as a student and also as a person."

What other communities do you belong to?
Outside of MaCSS, I am heavily involved with the Latinx community. I serve on the executive board for the school's first Latinx student organization, La Casa. My position is to plan and execute our annual leadership academy (LCLA), where Latinx underclassmen have the opportunity to freshen up their professional development and become Latinx leaders on campus."

What did the MaCSS Summer Institute mean to you?
"The MaCSS Summer Institute was something that unexpectedly changed my life here on campus. I didn't realize how much of an impact the program had on me until it was over. MaCSS has not only helped me financially, but also helped me become more passionate as a student. The rare one-on-one time I had with distinguished professors who were genuine and pushed me to think critically was something I thought I wouldn't get to experience at such a big school. I truly gained a support system with the relationships that I have made with peers and faculty on campus."

PROJECT HIGHLIGHT
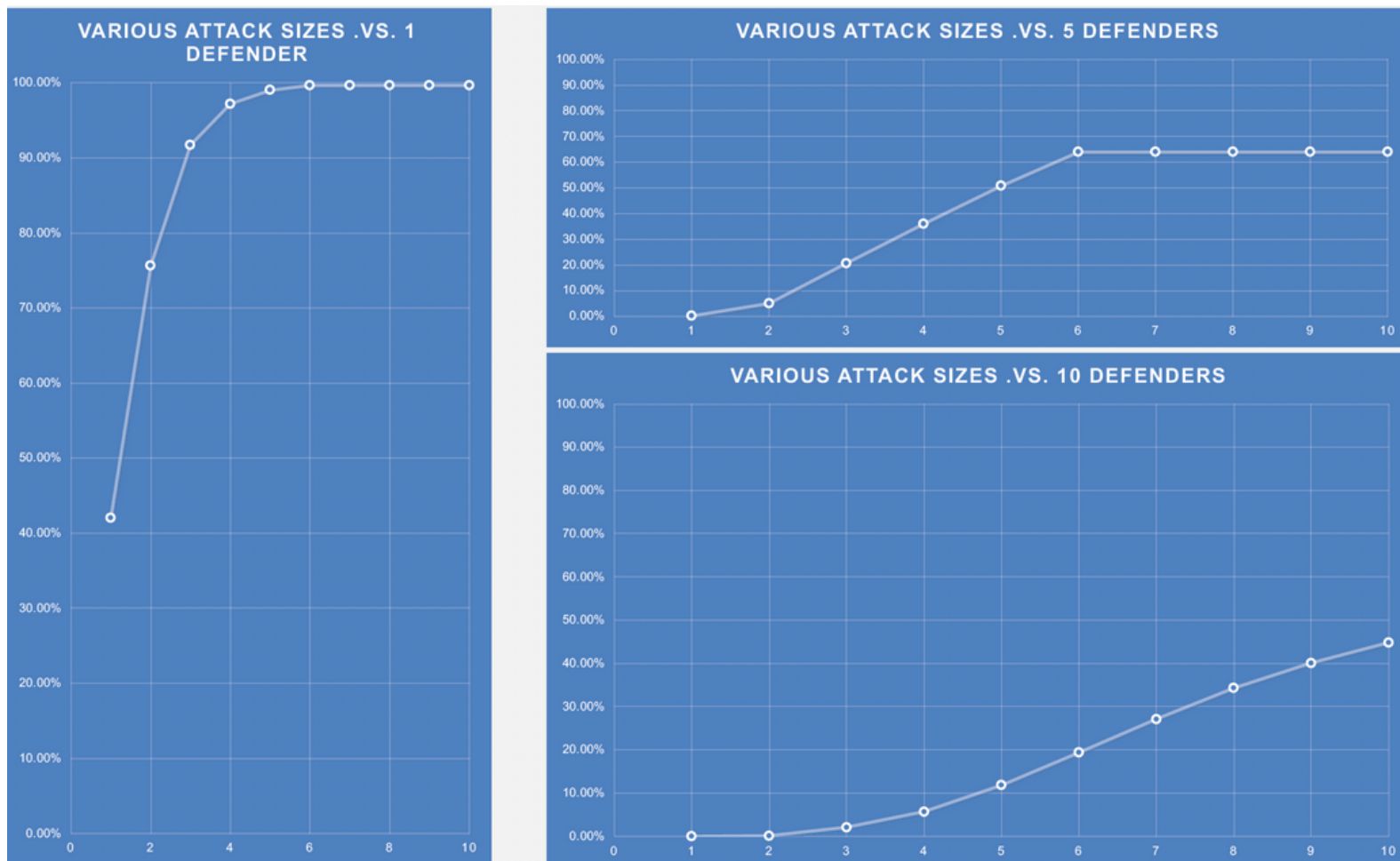
Application of Markov Chains to Model Strategies in the Game of Risk

Thomas M. and Maxwell D.

Abstract: Multiplayer strategy games have shown to provide useful applications of artificial intelligence (AI) methods (Assunção & Ferrari, 2022; Bauer, 2023; Gillenwater, 2022). Building upon current advancements in the field, Risk is a popular turn-based board game that holds potential for study. Due to the stochastic nature of the attack process and adherence to the Markov Property, a probabilistic approach can be pursued that employs a Markov Chain to answer questions on what an optimal attacking/defending strategy might look like.

FIELD TRIP HIGHLIGHT

Kayaking on the Huron River

"Kayaking was 10/10"

"Kayaking!!! It was super fun, great to get outside and moving, good bonding opportunity."

Our most ambitious fieldtrip of the summer was kayaking. We survived a lost phone, several tipped kayaks, at least one boat going the wrong way.

For many of the scholars, it was their first time kayaking. It was great to have both experienced and new kayakers together on this great Ann Arbor waterway.

GUEST SPEAKER HIGHLIGHT

# Ilesanmi Adeboye

Mathematician, Wesleyan College

> "YESSSSSSSSS MY FAVORITE!! I was so tired this day, but the way he presented the material and his loud voice kept me so awake and engaged. I want him to be my professor!!!"

Abstract: In this interactive session, we will explore how matrices, or more specifically matrix multiplication, encodes the geometry of two-dimensional space. The rotation, scaling, or shifting, of a parallelogram or triangle or circle in the plane can be described by matrix multiplication. Additional geometric transformations that can be given by matrix multiplication include reflection and shearing. As an application, we will discuss the important role matrix multiplication plays in computer graphics. The session will start by viewing matrix-vector multiplication from different perspectives. There will be hand-on activities where we answer questions of the form "Given a geometric transformation, what is the matrix that describes it?". We will also establish the link between matrix-matrix multiplication and the composition of geometric transformations. This will allow complex transformations to be described by simpler ones."
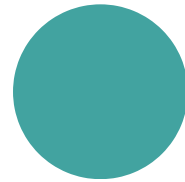
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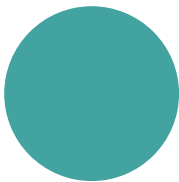
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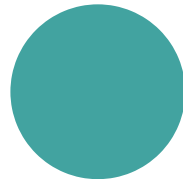
**COURSE
MATERIALS**

**SPEAKER
ABSTRACTS**