Saeede Kermani
January 29, 2019

My Motivation for Joining ACT2019 School

My interest in category theory started in my bachelor degree years and it is still my major interest. I decided to work on the modeling of natural language with categories for my master thesis. As I mentioned in my background letter I'm currently working on Dr. Mehrnoosh Sadrzadeh's papers for my master thesis. So this would be a very good opportunity for me to work on the projects related to my own research. And gain more experience in my field of study.

As I am completing my master degree and I decided to become a researcher and follow my education to Ph.D. and more I believe this internship which is exactly in my current field of research would not only be enriching for my academic advancement but would also deepen my understanding of the actual research that is going on in different fields of my interest. And therefore, help me to enrich my category theory knowledge so that I can become a better researcher in my own field. I am very excited about working on my interests in ACT2019 school and I am sure that such an experience would be extremely helpful in shaping my future academic life. As I see, the program is really comprehensive and working with best researchers in my field and the talented students that are chosen would be really helpful to increase my knowledge in category theory and it's applications.

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My Availability to Come to Oxford

Actually, it would cost too much for me if I want to come to Oxford on my own. Because I'm just a student and in our country there is no funding for students. And also my country is in a bad financial situation and the value of our money compared to the dollar is so low therefore it would be very hard for me to afford the money to buy tickets and pay for the hotel.

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My Order of Project Preference

1.Formal and experimental methods to reason about dialogue and discourse using categorical models of vector spaces. Mehrnoosh Sadrzadeh.

2.Toward a mathematical foundation for autopoiesis. David Spivak.

3.Complexity classes, computation, and Turing categories. Pieter Hofstra.

4.Partial evaluations, the bar construction, and second-order stochastic dominance. Tobias Fritz.

5.Simplifying quantum circuits using the ZX-calculus. Miriam Backens.

6.Traversal optics and profunctors. Bartosz Milewski

Saeede Kermani

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Research Interests

- Mathematical Logic
- category theory
- Computability Theory
- Combinatorics

Education

2017–Present **MSc in Computer Science**, *University of Tehran*, *Overall GPA: 17/20*.

2012–2017 **BSc in Computer Science** , *University of Tehran*, *Overall GPA: 15.91/20*, rank 4 among 30 students.
Average GPA among students in CS: 14.24

2005–2012 **Diploma in Mathematics**, *Farzanegan high school* , Tehran, *GPA: 19.5/20*.
Affiliated with the National Organization for Development of Exceptional Talents(NODET)

Research Experience

title *Assessment of Prediction of Different Metabolic Network Gap Filling Algorithms*

supervisor Sayed Amir Marashi

description In this project I tried to generate a random network and compare different methods of gap filling of matabolic networks.

title *Soccer League Competition Algorithm and Aolving Knapsack Problem with It*

supervisor Hedieh Sajedi

description In this research I worked on soccer league competion and some other heuristic algorithms. And then I tried to solve knapsack problem with this algorithm

title *Algorithms for Set-Cover Problem*

supervisors Mohammad Ganj Tabesh

description In this project I get familiar with different types of algorithms,like approximation algorithms and randomized algorithms that are used to solve hard problems. And then I did some research on set cover problem and different algorithms that are presented for this problem.

title *modeling the natural language with categories and bialgebras*

supervisors Majid Alizadeh

description Recently I started a research on category theory and the use of them in modeling the natural language. In this research I try to model the gramatical structure of language together with semantical structure and use bialgebras to embed these to structures to achieve better results.

Awards and Honors

- **Iranian Nationwide Examination for Entrance to Graduation Studies in CS**
  Ranked 46th among all participants.
- **National University Entrance Examination (Concours)**
  Ranked in top 1% nationally.
- **Finalist in 22nd Iranian National Olympiad in mathematics**
  Ranked in the top dozens among more than 20,000 competitors (Top 0.25%).

Relevant Courses

Bachelor Degree

- Combinatorics 20, rank 1 among 40
- Data Structure 19, rank 2 among 30
- Foundation of Logic 18.5, rank 1 among 50
- Automata Theory 19.5, rank 1 among 30

Master Degree

- Computability Theory 17, rank 2 among 20
- programming with coq 20, rank 1 among 20

Teaching Skills

Teacher Assistant in University of Tehran

Foundation of Logic	instructor: M.Mojtahedi	Fall-2016
Automata Theory	instructor: S.Kheradpishe	spring-2015
Foundations of Computer Science	instructor: B.Babaali	spring-2014

Language Skills

Persian	Native
English	Advanced

Programming Skills

java and C++	have good knowledge about object oriented languages
Latex	I almost present all my homework and projects in latex
Coq Proof Assistant	passed a course on programming with Coq

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OF TEHRAN

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To whom it may concern,

It is my pleasure to write a recommendation letter for Saeede Kermani, who has applied for a funding to participate in the Summer school ACT 2019. Saeede was accepted as a student of Computer science at school of mathematics, statistics and computer Science of University of Tehran 6 years ago. She got 4 courses with me titled Foundation of Math., Lattice theory, Non-classical logics and computability theory. In all of them he was one of the good students. In Autumn 2018 she was accepted as MSc student in CS at our school. Saeede is my M.Sc. student now. As part of her course work in this program she took two courses with me, Theoretical Computer Science and modal logic. She is working on her Msc thesis , titled " A Generalized Quantifier Theory of Natural Language, A Categorical study" under my supervision now.

Saeede is an industrious person and her mathematical thinking is good. She has a good knowledge in Mathematical Logic, logic programing and computability theory. I believe Miss Kermani is a capable person with a promising academic future. In order to improve Iranian society, specially Iranian women society, we need people like her to be as a role model for the generation to come, so I strongly recommended her admission to the program.

Yours faithfully,

Majid Alizadeh
February 1, 2019

Saeede Kermani
January 29, 2019

My Category Background

I become familiar with category theory in the first years of my bachelor degree in a course called lattice theory. Back at then, I've got really interested in category and keep it as one of the most interesting topics I've seen. However, there weren't so many courses in category theory for bachelor students and I couldn't follow my interest then.

In my master degree, I choose logic and computability as my field and took courses like computability and modal logic to be more connected to logic. I also talked to my supervisor Dr. Maid Alizadeh to work on categories and their applications. So we decide to choose my master thesis on modeling the natural language with categories. Which is totally based on Dr. Mehrnoosh Sadrzadeh's papers especially on "A Generalised Quantifier Theory of Natural Language in Categorical Compositional Distributional Semantics with Bialgebras". For that, I tried to read the category theory of Steve Awodey. And currently, I'm working on my thesis on the mentioned paper.

I intend to complete my master degree this September.