ADDITIONAL INFORMATION

CATEGORY THEORY BACKGROUND

First time I found out about the category theory in the books on functional analysis at the university but they contained only necessary and often non-systematic information on the subject. I have tried to read a lot of other books and papers - the best among them from my viewpoint at that time was 'Rosetta Stone' paper by Baez and Stay and 'Mathematical Physics' book by Robert Geroch, but I still felt that I needed a more straightforward introduction to the subject.

Then I found Bartosz Milewski's blog about functional programming and category theory and it was the exact thing I needed to start my education. It helped me to understand the subject better through programming. Even more, it motivated me to start learning Haskell. So, now I can say that the basis of my knowledge is the Bartosz's course on category theory. I have been continuously re-reading it for years so now I can say that I know in excellence the material presented in it.

For the last few years, I read many materials on the connected themes - M.Pickering, J. Gibbon's and W. Swierstra's papers on f-algebras, expression problem, programming patterns and profunctor optics, Dan Piponi blog, Conor McBride papers on derivatives and dissections, Lawvere "Conceptual Mathematics" as an introductory book to the topos theory and partially grasp the Goldblatt's "Topoi. The categorial analysis of logic".

Currently, I am reading G. M. Kelly's "Basic Concepts of Enriched Category Theory" to learn the basics of the enriched categories and studying more about free monoidal functors and Day convolution. I am interested in the later, because of their connections to the FunList type, which lies at the core of each traversable type.

PHD DETAILS

I am not enrolled into PhD program. But I have plans to apply for it in few years, when I will already have some results: publications, more specific goals and theme of research, as well as mentor. Now I feel the need to be more integrated into mathematician's society, that is why I am eager to visit the category theory conferences, schools and workshops. I find ACT2019 the perfect opportunity for my personal development.

ORDER OF PROJECT PREFERENCE

1. Bartosz Milewski. Traversal optics and profunctors.

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

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

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

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

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

TO WHAT EXTENT CAN YOU COMMIT TO COMING TO OXFORD?

I can fully fund myself in the case of need and therefore I commit to come to Oxford.

STATEMENT OF PURPOSE

WHO AM I?

I am a man who loves mathematics. When I was a boy, I enjoyed it just because math was a natural thing for me. I have always been fascinated by the world around me and wondering about how everything works. At the university, that led me to the physics. That is why I wrote my theses on the near-physics themes.

After completing my education, I started my work as a functional programmer. I was delighted that category theory can be so close to everyday practice. That was the point I switched my development to learning category theory and computer science in more detail.

HOW CAN I CONTRIBUTE TO THE APPLIED CATEGORY COMMUNITY?

I have been already contributing to the local functional programming communities in Ukraine, Belarus, Russia and Poland by giving talks on category theory and programming at the conferences, starting the 'f-Cafe' community in Ukraine and spreading the ideas among my colleagues.

In the future, I want to continue to do the same but on a new and more profound level. Currently, I see a few ways of contributing:

- Doing official academic research and earning a PhD, teaching people.
- Travelling and visiting conferences, schools and workshops on the category theory to share my knowledge and to meet new people and ideas.
- Making an impact through the internet by creating a blog dedicated to the theme and posting articles as well as video-lectures.

HOW CAN THIS SCHOOL HELP IN MY CAREER?

Thanks to ACT2019 school I may obtain the opportunity to achieve next goals regarding my career:

- Obtain better foundations for the future PhD application and research.
- Meet new math-friends and colleagues, work with the established researchers in the field.
- Get a publication of our group results in journals and n-category cafe.
- Learn new ideas from the papers studied during the school, which will make me a better professional.

HOW CAN THIS SCHOOL CONTRIBUTE TO MY RESEARCH GOALS?

This school can contribute to my research in the way that I will:

- Better understand the compositional nature of the Traversals and other optics. Use new knowledge in my current research about the DSL language for querying linguistic patterns in the constituency and dependency trees in NLP.
- Continue the work on the research theme with a mentor after the school.
- Make significant progress in my knowledge of category theory, so that I will be able to find more original ideas and visions for my current research which applies category theory to programming.

IAROSLAV KARKUNOV

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Grammarly Inc. ⋄ Kyiv, Ukraine

https://www.linkedin.com/in/karkunov

EDUCATION

NATIONAL TECHNICAL UNIVERSITY OF UKRAINE   *2012 - 2014*
Master of Science in System Analysis & Applied Mathematics   *Kyiv, Ukraine*
Supervisor: Prof. Yu. V. Bogdansky
Co-supervisor: Dr. Alexei Daletskii (University of York, UK)
Thesis: Differential geometry of the configuration spaces.

NATIONAL TECHNICAL UNIVERSITY OF UKRAINE   *2008 - 2012*
Bachelor of Science in System Analysis & Applied Mathematics   *Kyiv, Ukraine*
Supervisor: Prof. Yu. V. Bogdansky
Thesis: Calculus of variations in Banach spaces.

SUMMARY

I am a software developer with expertise in mathematics and independent researcher in my free time. My interest lies in the field of functional programming, applied category theory, HoTT and foundations of mathematics.

Also I am the founder of the f(Café) functional programmers community in Ukraine. It was created in order to unite people interested in functional programming and mathematics to help them with exchanging the ideas. I visited conferences in Ukraine and abroad, giving talks on programming and mathematics.

Moreover, I was a team leader and a programmer in one of the most prominent e-learning companies in Europe - Area9Learning. Now I am a part of the Grammarly Inc., where I work at the cutting edge of NLP and linguistics as software developer and researcher.

Outside of my regular job I self-educate myself and investigate connection between category theory, type theory and programming.

RESEARCH INTERESTS

My primary area of interest is the investigation of the place where the functional programming meets category theory.

Last few years I worked on understanding the programming patterns with the use of F-algebras, and as a result, I have conducted several talks for people in the industry.

Currently, at my job, I am doing research based on the Dan Piponi, and Conor McBride works on the regular expressions and type theory trying to obtain syntax and semantics for the DSL language for querying more elaborate linguistic patterns in the constituency and dependency trees used in NLP.

Also, in my free time, I am learning enriched category theory, investigating theory of Haskell optics. Now, researching monoidal functors and their connection to the FunList type, because of its importance for the traversals.

My other interests are studying HoTT, theoretical physics and differential geometry.

WORK EXPERIENCE

Grammarly, Inc   June 2018 - Now
Software Developer   *Kyiv, Ukraine*

· Investigating connections of the automata theory and applied category theory to NLP.
· Measuring the grammar error corrections algorithms quality.
· Improving the thesaurus and dictionaries.

Area9Learning, Inc   August 2013 - April 2018
Software Developer   *Copenhagen, Denmark*

· Team lead and 'Functional Programming and Mathematics' course instructor.
· Maintaining adaptive learning system and UI/UX development.
· Working on the functional reactive programming framework.

TALKS

EXPRESSION PROBLEM, GANG OF FOUR AND F-ALGEBRAS   *January 2018*
f(Cafe) Community Meetup   *Kyiv, Ukraine*

EXPRESSION PROBLEM: HOW TO WRITE EASY-EXTENSIBLE SOFTWARE?   *December 2017*
f(by) 2017 Conference on functional programming   *Minsk, Belarus*

HISTORY AND MATHEMATICS OF THE ALGORITHM   *March 2017*
f(Cafe) Community Meetup   *Kyiv, Ukraine*

CATEGORY THEORY, COMPOSITION AND FUNCTIONAL PROGRAMMING   *December 2016*
f(by) 2016 Conference on functional programming   *Minsk, Belarus*

APPLIED CATEGORY THEORY AND FUNCTIONAL PROGRAMMING   *October 2015*
KyivFProg 2015 Conference on functional programming   *Kyiv, Ukraine*

PROFESSIONAL DEVELOPMENT

Formalizing Natural Languages   *November 2018*
NooJ workshop by Max Silberztein at Grammarly   *Kyiv, Ukraine*

f(by) 2017   *December 2017*
Conference on functional programming   *Minsk, Belarus*

Lambda Days 2017   *February 2017*
Conference on functional programming   *Krakow, Poland*

f(by) 2016   *December 2016*
Conference on functional programming   *Minsk, Belarus*

Lambda Days 2016   *February 2016*
Conference on functional programming   *Krakow, Poland*

AWARDS AND HONORS

Magna Cum Laude   *2014*
M. Sc., National Technical University of Ukraine

Magna Cum Laude   *2012*
B. Sc., National Technical University of Ukraine

I was asked by Iaroslav Karkunov to write a recommendation letter for him. He seems very excited about the possibility of taking part in ACT. He's probably not a typical candidate (but then again, my proposal, and my team, are not very typical either). I have met Iaroslav twice: once at the conference in Krakow, Poland; and another time at a conference in Minsk, Belarus. We had several conversations on wide ranging topics: category theory, physics, and politics (with some Russians and Ukrainians). He also contacted me to ask for reading recommendations to prepare for research in category theory.

I had the impression that Iaroslav has a very inquisitive mind and thirst for knowledge. He's smart, hardworking, dedicated, and motivated. He doesn't have as many opportunities in Ukraine as he would in the West, and he'll have to do some catching up before he can take active part in research, but he seems to be making very good progress, and he has plenty of enthusiasm. I think he's a great candidate for participation in ACT.