
Interview request from Quanta Magazine

Josef Urban <josef.urban@gmail.com>
To: Stephen Ornes <stephen.ornes@gmail.com>

Tue, Aug 18, 2020 at 8:42 AM

Dear Stephen,

apart from the ENIGMA papers, there is a short video of our IJCAR'20 talk explaining ENIGMA: https://www.youtube.com/watch?v=XojOEpZfH4Y&list=PL11dj5prwUJynAkgOwTZ0_QLtGvVrY4F&index=12&t=0s

A growing collection of ENIGMA proofs compared to their human/Mizar counterparts is at https://github.com/ai4reason/ATP_Proofs/blob/master/README.md .

If you want more, take a look at the videos and slides of our MLR course: <http://arg.ciirc.cvut.cz/teaching/mlr20/> . E.g. <http://arg.ciirc.cvut.cz/teaching/mlr20/slides/3-apr-2020.mp4> explains the saturation setting and ML for it. <http://arg.ciirc.cvut.cz/teaching/mlr20/slides/17-apr-2020.mp4> goes more into specific neural architectures, Thibault's groundbreaking work on TacticToe is at <http://arg.ciirc.cvut.cz/teaching/mlr20/slides/30-apr-2020.mp4>, the first RL-for-TP work is explained in <http://arg.ciirc.cvut.cz/teaching/mlr20/slides/24-apr-2020.mp4>, etc.

Apart from the AGI'18 keynote I sent last time, there is also a longer and more recent tutorial talk I gave a year ago in Paris: <http://grid01.ciirc.cvut.cz/~mptp/formal19.pdf> . Contains some further interesting topics like symbolic rewriting (see also <https://arxiv.org/abs/1911.04873>), etc.

Best,
Josef
(still vacationing)

On Tue, Aug 11, 2020 at 7:10 PM Stephen Ornes <stephen.ornes@gmail.com> wrote:

Hi Josef,

Thanks again for your email and the links. I'm still putting the story together, so if you do have time to talk later this week or even early next, I'd be happy to call at your convenience. I'm particularly interested in hearing about your work using neural nets to combine the E ATP with the Mizar library, and how that gets you closer to conjecture.

Cheers,
Stephen

On Thu, Aug 6, 2020 at 10:00 AM Stephen Ornes <stephen.ornes@gmail.com> wrote:

Dear Josef,

Thanks for your email, and for the links. Especially given that you're biking in Norway! That sounds incredible about now.

I'll look through them today and likely send some follow up questions, just in case you do get a minute tomorrow. Unfortunately, my deadline is coming up next week and I think the magazine wants to publish it about a week after that, so we may not have the chance to connect via phone this time around.

I thought Google was at the forefront of this primarily because of Christian Szegedy's efforts, both in terms of publications and because other mathematicians I've spoken with have cited his work as showing the potential achievements of ATPs. But I'm still trying to get a handle on the bigger picture - is his group's work not at the front of the field?

Thanks again,
Stephen

On Thu, Aug 6, 2020 at 9:06 AM Josef Urban <josef.urban@gmail.com> wrote:

Dear Stephen,

Thanks for your interest in AITP.

I am currently biking in northern Norway without much electricity and signal. I can talk live probably in a week or two.

I am curious: why do you think Google has been at the forefront of this research?

Anyway, here are some quick comments.

The topic has been pushed mainly by the groups of Cezary Kaliszyk and me. Both of us got ERC grants (AI4REASON and SMART) in 2015/16 based on the work we did in this area before that. For more info see e.g. <http://ai4reason.org/demos.html> and the links there, e.g:

<https://www.sciencesquared.eu/artificial-intelligence#ai-question-3-can-computers-really-do-math>

<https://slideslive.com/38909911/no-one-shall-drive-us-from-the-semantic-ai-paradise-of-computer-understandable-math-and-science> .

There is a fresh recording of the last session of this year's CICM conference at http://grid01.ciirc.cvut.cz/~mptp/zoom_1.mp4 . For our work on neural conjecturing see the last talk. The paper has been submitted and put online in March and is now published: https://link.springer.com/chapter/10.1007/978-3-030-53518-6_24 . See also the abundant related work section there - in particular on neural/probabilistic autoformalization, analogy-based conjecturing, etc.

I also suggest looking at the papers at the AITP conferences: aitp-conference.org and the results of the yearly LTB (AITP division) of the yearly world championship in theorem proving CASC (no Google competing there ever): <http://www.tptp.org/CASC/J10/WWWFiles/DivisionSummary1.html>

If you are interested in honest (non-hype) comparisons of neural and non-neural approaches to guiding theorem provers, look e.g. at:

https://doi.org/10.1007/978-3-030-51054-1_29

https://doi.org/10.1007/978-3-030-29436-6_12

The following papers demonstrate the strength of some of the approaches. You will see that ML is very useful but neural nets were not needed:

<https://doi.org/10.4230/LIPIcs.ITP.2019.34>

<http://papers.nips.cc/paper/8098-reinforcement-learning-of-theorem-proving>

https://doi.org/10.1007/978-3-319-94205-6_37

<http://arxiv.org/abs/1804.00596>

Good luck with your story!

Josef
(I may read email tomorrow around the same time)

On Thu, Aug 6, 2020, 15:30 Stephen Ornes <stephen.ornes@gmail.com> wrote:

Dear Professor Urban,

I am a science and math writer in the US, and I'm currently working on an article about automated theorem provers for Quanta magazine.

I'll be highlighting recent advances in automated theorem provers, talking about the challenges of natural language processing and getting a system to generate interesting conjectures.

I'm looking for experts to comment on the state of the field and the relative strengths of approaches like Lean (which seems like it's somewhere between an interactive theorem prover and an automated one) and neural net-based approaches like DeepHOL, which uses the ITP HOList database, and how Mizur might inform ATPs.

For example: I'll be highlighting recent preprints by Google Research (this one on natural language <https://arxiv.org/pdf/2006.04757.pdf> and this one on a neural-net based theorem prover <https://arxiv.org/pdf/1904.03241.pdf>) .

I'd like to get your thoughts on the state of the science: Does this approach by Google look promising or interesting? Which approaches are the most promising to you?

Do you have time to talk today or tomorrow? I appreciate any time you can spare and estimate the interview will take about 25 minutes or so. If you let me know a good time and number, I'll be happy to give you a call. I'm in the central time zone in the US, so afternoon or evening your time might work best, but I'm flexible.

Thanks in advance, and I look forward to speaking with you,

Stephen Ornes

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