Curriculum vitae of RNDr. Pavel Klavík, Ph.D.

Software engineer at Google Zurich: Search and Knowledge Graphs.

Overview of my research and other academic activities in a structural diagram: `http://pavel.klavik.cz/orgpad/cv.html`.

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Born: 23/02/1988, Hořice, Czech Republic

Research Statement

Overview of my research projects:
`http://pavel.klavik.cz/research/projects/index.html`.

- *Relation between geometric representations and structural properties of graphs.* Given a geometrically represented graph, what structural knowledge can be derived from it? For instance, we show that symmetries of planar graphs can be understood.
- *Energy-aware computing and numerical linear algebra.* One of important problem for supercomputing is to make computations as efficient with respect to energy consumption as possible. Our study compared different methods for solving linear systems $A\boldsymbol{x} = \boldsymbol{b}$ from the point of energy consumption.
- *Scientific education and understanding of human mind.* We build a mathematical theory and computer tools to write down, understand and share structures in our mind. We are testing this approach in education of linear algebra at Charles University.

Teaching

- Teaching assistent at Charles University since 2008 (programming, discrete math, combinatorics and graph theory, linear algebra, analysis).
- Courses in Advance Linear Algebra (Fall 2013 and Fall 2016).
- Course in Complex Analysis via visual method (Spring 2016).
- List of books, lecture notes, and structural maps:

    1. Povídání o Lineární algebře (in Czech, in preparation): introductory linear algebra book, covers introduction to linear systems, vector spaces, matrices and linear mappings.
        `http://pavel.klavik.cz/vyuka/texty/povidani_o_la.html`.
    2. Lineární algebra III (in Czech): lecture notes for Advance Linear Algebra class.
        `http://pavel.klavik.cz/vyuka/texty/la3.html`.
    3. Pokročilé cvičení Lineární algebra II (in Czech): lecture notes for special recitations for second semester of Linear Algebra, covers orthogonality, determinants, eigenvalues and positive definite matrices.
        `http://pavel.klavik.cz/vyuka/texty/la2.html`.
    4. Strukturální mapa Lineární algebry (in Czech, in preparation): for my classes in 2015/2016 and 2016/2017, most important topics and their connections.
        `http://pavel.klavik.cz/orgpad/linearni_algebra.html`,
        How to use: `http://pavel.klavik.cz/orgpad/howto.html`,
        Supported browsers are Firefox and Google Chrome.

- List of my students:

    1. Peter Zeman 2012–2016:
        - Bachelor's thesis "Automorphism Groups of Geometrically Represented Graphs" (defended 2014),
        - Master thesis "Algebraic, Structural, and Complexity Aspects of Geometrically Represented Graphs" (defended 2016).

Programming and Work Experience

- Programming experience since youth.
- Good knowledge of C++, Java, Metapost.
- Basic knowledge of Perl, Clojure(Script).
- Head programmer and system analytic of a Java client-server application in TTC Marconi (from 2008 to 2009).
- Currently working on a new version (`http://orgpad.org`) of mind-modelling tool Orgpad. For an overview, see `http://pavel.klavik.cz/orgpad/index.html`.
- From February 2018, working as software engineer at Google Zurich on Search and Knowledge Graphs.

Stays abroad

- Participant of math research programs REU (Research Experiences for Undergraduate Students) 2009 and 2010 at Rutgers University, New Jersey.
- Participant of Great Minds student internship 2012 at IBM Research in Zurich.
- Young Research Participant of 4th Heidelberg Laureate Forum.
- Visitor of Japanese Advance Institute of Science and Technology in 2013 (one month), 2014 (one month) and 2016 (one month).
- Visitor of Kyoto University in 2013 (two weeks), 2014 (two weeks), 2015 (two weeks).

Competitions and Prizes

- A bronze medal winner of IOI 2007 (International Olympiad in Informatics).
- A participant of Central-European round of ACM ICPC (International Collegiate Programming Contest) in 2008, 2009 and 2010. The first place in the regional round CTUOpen 2009, third place in the regional round CTUOpen 2010.
- The third place in a competition of student papers SVOČ 2008, with the paper
    Jozef Jirásek, Pavel Klavík – Recoloring k-trees.
    `http://pavel.klavik.cz/pub/08-recoloring.pdf`
- The first place in a competition of student papers SVOČ 2009, with the thesis
    Jozef Jirásek, Pavel Klavík – Lines in Graphs.
    `http://pavel.klavik.cz/pub/09-lines_in_graphs.pdf`
- The first place in a competition of student papers SVOČ 2012, with the thesis
    Pavel Klavík – Extending Partial Representations of Interval Graphs.
    `http://pavel.klavik.cz/pub/svoc_int_graphs.pdf`
- Laureate of Jiří Matoušek Prize 2017 of Charles University together with Peter Zeman for the paper "Automorphism Groups of Geometrically Represented Graphs".

Education

- Bachelor degree at Charles University in 2010.
- Bachelor's Thesis – *Geometric Representations of Graphs*.
    `http://pavel.klavik.cz/pub/bachelors_thesis.pdf`
- Master degree at Charles University in 2012.
- Master Thesis – *Extending Partial Representations of Graphs*.
    `http://pavel.klavik.cz/pub/master_thesis.pdf`
- Doctoral degree at Charles University in 2017.
- Doctoral Thesis – *Extension Properties of Graphs and Structures*.
    `http://pavel.klavik.cz/pub/phd_thesis.pdf`

Language skills

- Fluent in Czech and English.

- Basic knowledge of German and Japanese.

Journal papers

1. Pavel Klavík, Daniel Král', and Lukáš Mach: *Triangles in arrangements of points and lines in the plane.* Journal of Combinatorial Theory, Series A 118(3):1140–1142, 2011.
2. Pavel Klavík, A. Cristiano I. Malossi, Constantin Bekas, and Alessandro Curioni: *Changing Computing Paradigms Towards Power Efficiency.* Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 372(2018), 2014.
3. Pavel Klavík, Jan Kratochvíl, Yota Otachi, and Toshiki Saitoh: *Extending Partial Representations of Subclasses of Chordal Graphs.* Theoretical Computer Science 576:85–101, 2015.
4. Pavel Klavík, Jan Kratochvíl, Yota Otachi, Ignaz Rutter, Toshiki Saitoh, Maria Saumell, and Tomáš Vyskočil: *Extending Partial Representations of Proper and Unit Interval Graphs.* Algorithmica 77(4):1071–1104, 2017.
5. Pavel Klavík, Jan Kratochvíl, Yota Otachi, Toshiki Saitoh, and Tomáš Vyskočil: *Extending Partial Representations of Interval Graphs.* Algorithmica 78(3):945–967, 2017.
6. James Abello, Pavel Klavík, Jan Kratochvíl, and Tomáš Vyskočil: *MSOL Restricted Contractibility to Planar Graphs.* Theoretical Computer Science 676:1–14, 2017.
7. Tomáš Gavenčiak, Przemysław Gordinowicz, Vít Jelínek, Pavel Klavík, and Jan Kratochvíl: *Cops and Robbers on Intersection Graphs.* European Journal of Combinatorics 72:45–69, 2018.
8. Jiří Fiala, Pavel Klavík, Jan Kratochvíl, and Roman Nedela: *3-connected Reduction for Regular Graph Covers.* European Journal of Combinatorics 73:170–210, 2018.
9. Pavel Klavík, and Maria Saumell: *Minimal Obstructions for Partial Representations of Interval Graphs.* The Electronic Journal of Combinatorics 25(4):P4.55, 2018.
10. Pavel Klavík, Yota Otachi, and Jiří Šejnoha: *On the Classes of Interval Graphs of Limited Nesting and Count of Lengths.* Algorithmica 81(4):1490–1511, 2019.
11. Steve Chaplick, Radoslav Fulek, and Pavel Klavík: *Extending Partial Representations of Circle Graphs.* Journal of Graph Theory 91(4):365–394, 2019.
12. Ken-ichi Kawarabayashi, Pavel Klavík, Bojan Mohar, Roman Nedela, and Peter Zeman: *Isomorphisms of maps on the sphere.* Accepted to Contemporary Mathematics, 2019.
13. Pavel Klavík, and Peter Zeman: *Automorphism Groups of Geometrically Represented Graphs.* Accepted to Ars Mathematica Contemporanea, 2019.

Conference proceedings

1. Jozef Jirásek, and Pavel Klavík: *Structural and Complexity Aspects of Line Systems of Graphs.* In Algorithms and Computation, ISAAC 2010, volume 6506 of Lecture Notes in Computer Science, pages 157–168, 2010.
2. Ondřej Bílka, Jozef Jirásek, Pavel Klavík, Martin Tancer, and Jan Volec: *On the Complexity of Planar Covering of Small Graphs.* In Graph-Theoretic Concepts in Computer Science, WG 2011, volume 6986 of Lecture Notes in Computer Science, pages 83–94, 2011.
3. Pavel Klavík, Jan Kratochvíl, and Tomáš Vyskočil: *Extending Partial Representations of Interval Graphs.* In Theory and Applications of Models of Computation, TAMC 2011, volume 6648 of Lecture Notes in Computer Science, pages 276–285, 2011.
4. James Abello, Pavel Klavík, Jan Kratochvíl, and Tomáš Vyskočil: *MSOL Restricted Contractibility to Planar Graphs.* In Parameterized and Exact Computation, IPEC 2012, volume 7535 of Lecture Notes in Computer Science, pages 194–205, 2012.
5. Pavel Klavík, Jan Kratochvíl, Tomasz Krawczyk, and Bartosz Walczak: *Extending Partial Representations of Function Graphs and Permutation Graphs.* In Algorithms, ESA 2012, volume 7501 of Lecture Notes in Computer Science, pages 671–682, 2012.
6. Pavel Klavík, Jan Kratochvíl, Yota Otachi, and Toshiki Saitoh: *Extending Partial Representations of Subclasses of Chordal Graphs.* In Algorithms and Computation, ISAAC 2012, volume 7676 of Lecture Notes in Computer Science, pages 444–454, 2012.
7. Steve Chaplick, Radoslav Fulek, and Pavel Klavík: *Extending Partial Representations of Circle*

Graphs. In Graph Drawing, GD 2013, volume 8242 of Lecture Notes in Computer Science, pages 131–142, 2013.

8. Martin Balko, Pavel Klavík, and Yota Otachi: *Bounded Representations of Interval and Proper Interval Graphs.* In Algorithms and Computation, ISAAC 2013, volume 8283 of Lecture Notes in Computer Science, pages 535–546, 2013.

9. Tomáš Gavenčiak, Vít Jelínek, Pavel Klavík, and Jan Kratochvíl: *Cops and Robbers of Intersection Graphs.* In Algorithms and Computation, ISAAC 2013, volume 8283 of Lecture Notes in Computer Science, pages 174–184, 2013.

10. Jiří Fiala, Pavel Klavík, Jan Kratochvíl, and Roman Nedela: *Algorithmic Aspects of Regular Graph Covers with Applications to Planar Graphs.* In Automata, Languages, and Programming, ICALP 2014, volume 8572 of Lecture Notes in Computer Science, pages 489–501, 2014.

11. Pavel Klavík, Jan Kratochvíl, Yota Otachi, Ignaz Rutter, Toshiki Saitoh, Maria Saumell, and Tomáš Vyskočil: *Extending Partial Representations of Proper and Unit Interval Graphs.* In Algorithm Theory, SWAT 2014, volume 8503 of Lecture Notes in Computer Science, pages 253–264, 2014.

12. Pavel Klavík, and Maria Saumell: *Minimal Obstructions for Partial Representations of Interval Graphs.* In Algorithms and Computation, ISAAC 2014, volume 8889 of Lecture Notes in Computer Science, pages 401–413, 2014.

13. Pavel Klavík, and Peter Zeman: *Automorphism Groups of Geometrically Represented Graphs.* In 32nd International Symposium on Theoretical Aspects of Computer Science, STACS 2015, volume 30 of Leibniz International Proceedings in Informatics (LIPIcs), pages 540–553, 2015.

14. Tomáš Gavenčiak, Przemysław Gordinowicz, Vít Jelínek, Pavel Klavík, and Jan Kratochvíl: *Cops and Robbers on String Graphs.* In Algorithms and Computation, ISAAC 2015, volume 9472 of Lecture Notes in Computer Science, pages 355–366, 2015.

15. Pavel Klavík, Yota Otachi, and Jiří Šejnoha: *On the Classes of Interval Graphs of Limited Nesting and Count of Lengths.* In 27th International Symposium on Algorithms and Computation, ISAAC 2016, volume 64 of Leibniz International Proceedings in Informatics (LIPIcs), pages 45:1–45:13, 2016.

Submitted

1. Jiří Fiala, Pavel Klavík, Jan Kratochvíl, and Roman Nedela: *Algorithmic Aspects of Regular Graphs Covers.* Submitted, 2017.

2. Pavel Klavík, Roman Nedela, and Peter Zeman: *Jordan-like Characterization of Automorphism Groups of Planar Graphs.* Submitted, 2015.

3. Pavel Klavík, Dušan Knop, and Peter Zeman: *Graph Isomorphism Restricted by Lists.* Submitted, 2016.

4. Vít Kalisz, Pavel Klavík, and Peter Zeman: *Circle Graph Isomorphism in Almost Linear Time.* Submitted, 2019.

In preparation

1. Martin Balko, Pavel Klavík, and Yota Otachi: *Bounded Representations of Interval and Proper Interval Graphs.* In preparation, 2013.

2. Pavel Klavík, Yota Otachi, and Jiří Šejnoha: *Extending Partial Representations of Interval Graphs of Limited Nesting.* In preparation, 2017.

Invited Talks

1. Jiří Fiala, Pavel Klavík, Jan Kratochvíl, and Roman Nedela: *On the Complexity of Planar Regular Covering.* Algorithmic, Topological and Complexity Aspects of Graphs Covers (ATCAGC), 2013.

2. Pavel Klavík, A. Cristiano I. Malossi, Constantin Bekas, and Alessandro Curioni: *Energy consumption of scientific computations (in Czech).* Matej Bel University, Banská Bystrica, Slovakia, 2014.

3. Jiří Fiala, Pavel Klavík, Jan Kratochvíl, and Roman Nedela: *Algorithmic Aspects of Regular Graph Covers with Applications to Planar Graphs.* Algebraic, Topological and Complexity Aspects of

Graph Covers (ATCAGC), 2015.