

O-joung Kwon

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Ph.D Advisor : Sang-il Oum (<http://mathsci.kaist.ac.kr/~sangil>)

RESEARCH INTERESTS

Graph theory, Combinatorial Optimization, Structural Graph Theory, Parameterized Complexity.

I am interested in various structural aspects of graphs. Tree-width and rank-width are graph width parameters that I have been mainly working on. Especially generalizing well-developed theory on tree-width and graph minor operation to rank-width and vertex-minor operation is one of main projects. Our community conjectured that for every circle graph H , there is a large constant c_H such that every graph of rank-width at least c_H must contain H as a vertex-minor. The other interesting conjecture is Geelen's conjecture that for every graph H , the class of graphs having no H vertex-minor is chi-bounded. We are still very far from completely understanding about these conjectures, and I am trying to extend knowledge about these conjectures. Recently I am working a lot on mim-width parameter, which is relatively new, and generalizes tree-width and rank-width.

Parameterized complexity and multivariate algorithmics are other main area of my research. Different from classical analysis on algorithms, in this area, we are interested in analyzing with additional parameters. For instance, the problem of seeking a vertex cover of size at most k is an NP-hard problem, but it can be solved in time $2^{O(k)}poly(n)$. If an algorithm with running time $f(k)poly(n)$ exists, then we say that the problem is fixed parameter tractable with respect to the parameter k . There are lots of interesting open problems in this area about determining some problem is fixed parameter tractable or not, or for some fixed parameter tractable problem, finding an optimal running with respect to the function of parameter k . Especially obtaining a polynomial kernelization algorithm is quite related to structural graph theory, and in this connection, I am interested in designing kernelization algorithms on various graph modification problems. One of big problems in the area is to know whether Interval Vertex Deletion admits a polynomial kernel or not. We have a very strong community; see wiki homepage <http://fpt.wikidot.com/> for looking at news, new papers, and newly announced jobs.

PREVIOUS POSITIONS

Researcher (Postdoc), Institut für Softwaretechnik und Theoretische Informatik, Technische Universität Berlin, Berlin, Germany

Advisor: Stephan Kreutzer

Jul, 2016 ~ Feb, 2018

Joined in ERC consolidator grant DISTRUCT : Structure Theory for Directed Graphs

Researcher (Postdoc), Institute for Computer Science and Control (MTA SZTAKI), Hungarian Academy of Sciences, Budapest, Hungary

Advisor: Dániel Marx

Jul, 2015 ~ Jun, 2016

Joined in ERC Project PARAMTIGHT : Parameterized complexity and the search for tight complexity results

EDUCATION

Ph.D. Department of Mathematical Sciences

Sep, 2012 ~ Aug, 2015

KAIST, Daejeon, South Korea
Advisor: Sang-il Oum
Thesis title: Structural and algorithmic properties of linear rank-width

M.S. Department of Mathematical Sciences Sep, 2010 ~ Aug, 2012
KAIST, Daejeon, South Korea
Thesis title: Connecting rank-width and tree-width via pivot-minors

B.S. Department of Mathematics Mar, 2003 ~ Aug, 2010
Hanyang University, Seoul, South Korea
(including 2 years for military service)

JOURNAL PAPERS

- 11) A width parameter useful for chordal and co-comparability graphs.
Dong Yeup Kang, **O-joung Kwon**, Torstein Stromme, and Jan Arne Telle
[Theoretical Computer Sci. 704 \(15. Dec. 2017\), pp 1-17.](#)
Full version : <https://arxiv.org/abs/1606.08087>
[The 11th International Conference and Workshops on Algorithms and Computation \(WALCOM 2017\)](#)
Proceeding : https://link.springer.com/chapter/10.1007/978-3-319-53925-6_8
- 10) Packing and covering immersion models of planar subcubic graphs.
Archontia Giannopoulou, **O-joung Kwon**, Jean-Florent Raymond, and Dimitrios M. Thilikos.
[European J. Combin. 65 \(Oct. 2017\), pp 154-167.](#)
<https://arxiv.org/abs/1602.04042>
[42nd International Workshop on Graph-Theoretic Concepts in Computer Science \(WG 2016\)](#)
Proceeding : <http://link.springer.com/book/10.1007/978-3-662-53536-3>
- 9) A polynomial kernel for Block Graph Deletion.
Eun Jung Kim and **O-joung Kwon**.
[Algorithmica. \(Sep, 2017\), pp 251-270.](#)
<https://arxiv.org/abs/1506.08477>, DOI: 10.1007/s00453-017-0316-2
[10th International Symposium on Parameterized and Exact Computation \(IPEC 2015\)](#)
Proceeding : http://drops.dagstuhl.de/opus/frontdoor.php?source_opus=5589
- 8) An FPT algorithm and a polynomial kernel for linear rank-width one vertex deletion.
Mamadou Kanté, Eun Jung Kim, **O-joung Kwon**, and Christophe Paul.
[Algorithmica. 79 \(Sep, 2017\), pp 66-95](#)
<http://dx.doi.org/10.1007/s00453-016-0230-z>
[10th International Symposium on Parameterized and Exact Computation \(IPEC 2015\)](#)
Proceeding : http://drops.dagstuhl.de/opus/frontdoor.php?source_opus=5578
- 7) Linear rank-width of distance-hereditary graphs I. A polynomial time algorithm.
Isolde Adler, Mamadou Kanté, and **O-joung Kwon**.
[Algorithmica. 78 \(May, 2017\), pp 342-377](#)
<http://dx.doi.org/10.1007/s00453-016-0164-5>
[40th International Workshop on Graph-Theoretic Concepts in Computer Science \(WG 2014\)](#)
Proceeding : <http://link.springer.com/book/10.1007/978-3-319-12340-0>
- 6) Coloring graphs without fan vertex-minors and graphs without cycle pivot-minors.
Ilkyoo Choi, **O-joung Kwon**, and Sang-il Oum.
[Journal of Combin. Theory Ser. B. 123 \(March, 2017\), pp. 126-147](#)
<http://dx.doi.org/10.1016/j.jctb.2016.11.007>
- 5) Characterizing width two for variants of treewidth.
Hans L. Bodlaender, Stefan Kratsch, Vincent Kreuzen, **O-joung Kwon**, and Seongmin Ok.
[Discrete Applied Math. 216 \(Jan 10, 2017\), pp. 29-46](#)

<http://dx.doi.org/10.1016/j.dam.2015.01.015>

4) Tree-depth and vertex-minors.

Péτρ Hlineny, **O-joung Kwon**, Jan Obdrzalek, and Sebastian Ordyniak.

[European J. Combin. 56 \(August, 2016\), pp. 46-56](#)

<http://dx.doi.org/10.1016/j.ejc.2016.03.001>

3) Excluded vertex-minors for graphs of linear rank-width at most k .

Jisu Jeong, **O-joung Kwon** and Sang-il Oum.

[European J. Combin. 41\(October, 2014\), pp. 242-257](#)

<http://dx.doi.org/10.1016/j.ejc.2014.04.010>

[30th International Symposium on Theoretical Aspects of Computer Sciences \(STACS 2013\)](#)

Proceeding : http://drops.dagstuhl.de/opus/frontdoor.php?source_opus=3936

2) Unavoidable vertex-minors in large prime graphs.

O-joung Kwon and Sang-il Oum.

[European J. Combin. 41\(October, 2014\), pp. 100-127](#)

<http://dx.doi.org/10.1016/j.ejc.2014.03.013>

1) Graphs of small rank-width are pivot-minors of graphs of small tree-width.

O-joung Kwon and Sang-il Oum.

[Discrete Applied Math. 168\(May 11, 2014\), pp. 108-118](#)

<http://dx.doi.org/10.1016/j.dam.2013.01.007>

**REFEREED
CONFERENCE
PAPERS
WITHOUT
JOURNAL
VERSION**

9) Erdos-Posa property of chordless cycles and its applications

Eun Jung Kim and **O-joung Kwon**

[SIAM: ACM-SIAM Symposium on Discrete Algorithms \(SODA18\)](#)

Webpage : http://www.dcs.warwick.ac.uk/~czumaj/SODA_2018_List_of_accepted_papers.htm

Full version : <https://arxiv.org/abs/1711.00667>.

8) Polynomial-time algorithms for the Longest Induced Path and Induced Disjoint Paths problems on graphs of bounded mim-width

Lars Jaffke, **O-joung Kwon**, and Jan Arne Telle

[The 12th International Symposium on Parameterized and Exact Computation \(IPEC 2017\)](#)

Webpage : <https://algo2017.ac.tuwien.ac.at/ipec/accepted-papers/>

Full version : <https://arxiv.org/abs/1708.04536>.

7) Generalized feedback vertex set problems on bounded-treewidth graphs: chordality is the key to single-exponential parameterized algorithms.

Édouard Bonnet, Nick Brettell, **O-joung Kwon**, and Dániel Marx

[The 12th International Symposium on Parameterized and Exact Computation \(IPEC 2017\)](#)

Webpage : <https://algo2017.ac.tuwien.ac.at/ipec/accepted-papers/>

Full version : <http://arxiv.org/abs/1704.06757>.

6) On low rank-width colorings.

O-joung Kwon and Michał Pilipczuk and Sebastian Siebertz

[43rd International Workshop on Graph-Theoretic Concepts in Computer Science \(WG 2017\)](#)

Webpage : <http://www.win.tue.nl/wg2017/#Program>

Full version : <https://arxiv.org/abs/1703.03304>

5) Neighborhood complexity and kernelization for nowhere dense classes of graphs.

Kord Eickmeyer, Archontia Giannopoulou, Stephan Kreutzer, **O-joung Kwon**, Michał Pilipczuk, Roman Rabinovich, and Sebastian Siebertz

[The 44th International Colloquium on Automata, Languages, and Programming \(ICALP 2017\)](#)

Webpage : http://icalp17.mimuw.edu.pl/?page_id=341

Full version : <https://arxiv.org/abs/1612.08197>

4) An optimal XP algorithm for Hamiltonian cycle on graphs of bounded clique-width.

Benjamin Bergougnoux and Mamadou Kanté and **O-joung Kwon**
[The 15th Algorithms and Data Structures Symposium \(WADS 2017\)](#)
Webpage : <http://people.scs.carleton.ca/~wads/AcceptedPapers/accepted.html>
Full version : <https://arxiv.org/abs/1702.06095>

3) A polynomial kernel for Distance-Hereditary Vertex Deletion.
Eun Jung Kim and **O-joung Kwon**.
[The 15th Algorithms and Data Structures Symposium \(WADS 2017\)](#)
Webpage : <http://people.scs.carleton.ca/~wads/AcceptedPapers/accepted.html>
Full version : <https://arxiv.org/abs/1610.07229>

2) A single-exponential fixed-parameter algorithm for Distance-Hereditary Vertex Deletion.
Eduard Eiben, Robert Ganian, and **O-joung Kwon**.
[41st International Symposium on Mathematical Foundations of Computer Science \(MFCS 2016\)](#)
Proceeding : <http://drops.dagstuhl.de/opus/volltexte/2016/6448/>
Full version : <https://arxiv.org/abs/1604.06056>

1) Parameterized vertex deletion problems for hereditary graph classes with a block property.
Edouard Bonnet, Nick Brettell, **O-joung Kwon**, and Dániel Marx.
[42nd International Workshop on Graph-Theoretic Concepts in Computer Science \(WG 2016\)](#)
Proceeding : <http://link.springer.com/book/10.1007/978-3-662-53536-3>
Full version : <https://arxiv.org/abs/1603.05945>

**NEW
SUBMITTED
MANUSCRIPTS**

3) A unified polynomial-time algorithm for Feedback Vertex Set on graphs of bounded mim-width
Lars Jaffke, **O-joung Kwon**, and Jan Arne Telle
<https://arxiv.org/abs/1710.07148>, submitted 2017.

2) Chi-boundedness of graph classes excluding wheel vertex-minors.
Hojin choi, **O-joung Kwon**, Sang-il Oum, and Paul Wollan
<https://arxiv.org/abs/1702.07851>, submitted 2017.

1) Linear rank-width of distance-hereditary graphs II. Vertex-minor obstructions.
Isolde Adler, Mamadou Moustapha Kanté and **O-joung Kwon**.
<https://arxiv.org/abs/1508.04718>, submitted 2015.

**HONORS AND
GRANTS**

RWTH Aachen University Research Fellowship Korea	Jan - Mar, 2015
KIAS Fellowship for Seoul ICM 2014	August, 2014
SIAM Student Travel Award for SIAM Conference on Discrete Mathematics	June, 2014
Travel Grants for graduate students and young researchers for 14th Max Planck Advanced Course on the Foundations of Computer Science	Aug, 2013
National Research Scholarship by the Korea Student Aid Foundation	Sep, 2010 ~
National Scholarship for Science and Engineering Students (KOSAF) - Tuition exemption	03-04, 08-10

**RESEARCH
VISITINGS**

University of Bari, Bari, Italy Hosted by Prof. Paul Wollan	13–17. Nov. 2017
University of Waterloo, Waterloo, Canada Hosted by Dr. Ringi Kim	24–28. Jul. 2017

University of Lyon, Lyon, France Hosted by Dr. Valia Mitsou	3–7. Apr. 2017
Universidad Politecnica de Valencia, Valencia, Spain Hosted by Prof. Jan Arne Telle	27. Mar. 2017 - 1. Apr. 2017
Durham University, Durham, UK Hosted by Prof. Daniel Paulusma	27. Feb. 2017 - 3. Mar. 2017
University of Warsaw, Warsaw, Poland Hosted by Prof. Marcin Pilipczuk	11–13. Jan. 2017
Universite Blaise Pascal in Clermont-ferrand, France Hosted by Prof. Mamadou Moustapha Kanté	7–12. Nov. 2016
University of Bergen in Bergen, Norway Hosted by Prof. Jan Arne Telle	22–28. May. 2016
TU Wien in Vienna, Austria Hosted by Dr. Robert Ganian	14–18. Mar. 2016
Masaryk University in Brno, Czech Hosted by Prof. Pétr Hlineny	16–20, Nov, 2015
MTA SZTAKI in Budapest, Hungary Hosted by Prof. Dániel Marx	22–28, Mar, 2015
Denmark Technical University in Lyngby, Denmark Hosted by Prof. Carsten Thomassen	23–27, Feb, 2015
Bonn University in Bonn, Germany Hosted by Prof. Stefan Kratsch	16–18, Feb, 2015
LIRMM in Montpellier, France Hosted by Prof. Christophe Paul	26–30, Jan, 2015
RWTH Aachen University in Aachen, Germany Hosted by Prof. Peter Rossmanith	6, Jan, 2015 - 31, Mar, 2015
Universite Blaise Pascal in Clermont-ferrand, France Hosted by Prof. Mamadou Moustapha Kanté	7–21, Jul, 2014
Utrecht University in Utrecht, Netherlands Hosted by Prof. Hans Bodlaender	15, Feb, 2014 - 7, Mar, 2014
Universite Blaise Pascal in Clermont-ferrand, France Hosted by Prof. Mamadou Moustapha Kanté	8–21, Jul, 2013
Masaryk University in Brno, Czech Hosted by Prof. Pétr Hlineny	19–24, May, 2013
University of Hamburg in Hamburg, Germany Hosted by Prof. Reinhard Diestel	13, Feb, 2013 - 31, Aug, 2013
RESEARCH TALKS	
Chi-boundedness of graph classes excluding wheel vertex-minors Eurocomb 2017 at TU Vienna, Vienna, Austria	31th Aug, 2017.

A polynomial kernel for Distance-Hereditary Vertex Deletion
 An optimal XP algorithm for Hamiltonian Cycle on graphs of bounded clique-width
 Algorithms and Data Structures Symposium 2017 at Memorial Univ of Newfoundland, St. John's,
 Canada
 31 July-2 Aug, 2017.

Chi-boundedness of graph classes excluding wheel vertex-minors
 Structure in Graphs and Matroids 2017 at Univ. of Waterloo, Waterloo, Canada 19 July, 2017.

Low rank-width colorings
 ICALP satellite conference. Algorithms and Structure for Sparse Graphs at Univ. Warsaw, Warsaw,
 Poland 16 July, 2017.

Low rank-width colorings
 Discrete Math Seminar at KAIST 9 Jun, 2017.

Low rank-width colorings
 Seminar at TU Berlin, Berlin, Germany 28 Apr, 2017

Low rank-width colorings
 Graphes at Lyon, Lyon, France 7 Apr, 2017

Algorithmic perspective of rank-width
 Acid Seminar at Durham University, Durham, UK 27 Feb, 2017

A single-exponential fixed parameter algorithm for Distance-Hereditary Vertex Deletion
 Seminar at University of Warsaw, Warsaw, Poland 12 Jan, 2017

A single-exponential fixed parameter algorithm for Distance-Hereditary Vertex Deletion
 The 14th KIAS Combinatorics Workshop at Busan 19 Dec, 2016

Coloring graphs without fan vertex-minors
 80th KPPY Combinatorics Workshop at Yeungnam Univ, Daegu 17 Dec, 2016

Generalized feedback vertex set problems on bounded-treewidth graphs
 KAIST Discrete Math Seminar at KAIST 25 Nov, 2016

Parameterized complexity of measuring distances to dense graph classes
 Colloquium talk on Methods for Discrete Structures, Berlin, Germany 24 Oct, 2016

Coloring graphs without fan vertex-minors and cycle pivot-minors
 Southern Italian Workshop on Algorithms and Graphs 2016, Bari, Italy 26 Sep, 2016

A single-exponential fixed parameter algorithm for Distance-Hereditary Vertex Deletion
 MFCS 2016, Krakow, Poland 22 Aug, 2016

A single-exponential fixed parameter algorithm for Distance-Hereditary Vertex Deletion
 Seminar at University of Bergen, Bergen, Norway 27 May, 2016

A single-exponential fixed parameter algorithm for Distance-Hereditary Vertex Deletion
 Seminar at MTA SZTAKI, Budapest, Hungary 5 May, 2016

Deletion problems regarding graphs of bounded rank-width
 Seminar at TU Wien in Vienna, Austria 14. Mar, 2016

Erdős-Pósa property of planar- H -minor models with prescribed vertex sets
 Seminar at Masaryk University, Brno, Czech 16, Nov, 2015

Erdős-Pósa property of planar- H -minor models with prescribed vertex sets Seminar at MTA SZTAKI, Budapest, Hungary	28, Oct, 2015
Erdős-Pósa property of planar- H -minor models with prescribed vertex sets 7th GROW, Aussois, France	12, Oct, 2015
A polynomial kernel for Block Graph Deletion IPEC 2015, Patras, Greece	16, Sep, 2015
An FPT algorithm and a polynomial kernel for linear rank-width one vertex deletion IPEC 2015, Patras, Greece	16, Sep, 2015
A polynomial kernel for Block Graph Deletion Seminar at MTA SZTAKI, Budapest, Hungary	29, Jul, 2015
Block Graph Deletion Seminar at Korea University, Seoul, Korea	29, May, 2015
Linear Rank-width One Vertex Deletion 2015 spring annual meeting of the KMS, Pusan National University	25, Apr, 2015
Length constraint versions of Gallai's A -path Theorem Seminar at KAIST	15, Apr, 2015
A fixed parameter tractable algorithm for the Rank-width 1 Vertex Deletion problem Seminar at Bonn University, Bonn, Germany	18, Feb, 2015
Linear rank-width of distance-hereditary graphs CIRM workshop on Graph Decompositions, Marseille, France	22, Jan, 2015
Fixed parameter tractability of the thread vertex deletion problem 66th KPPY Combinatorics Workshop, Yeungnam University	20, Sep, 2014
Excluded vertex-minors for linear rank-width at most k ICM 2014, COEX, Seoul, Korea	13, August, 2014
Linear rank-width of distance-hereditary graphs ICM 2014 Satellite Conference on Extremal and Structural Graph Theory The-K Gyeongju Hotel, Gyeongju, Korea	8, August, 2014
Linear rank-width of distance-hereditary graphs WG 2014, Le Domaine de Chales, Orleans, France	26, June, 2014
Excluded vertex-minors for linear rank-width at most k 2014 SIAM Discrete Math Conference Hyatt Regency Minneapolis Minneapolis, Minnesota, USA	18, June, 2014
Linear rank-width of distance-hereditary graphs The 4th KIAS Combinatorics Workshop, KIAS	30, May, 2014
Characterizing width two for variants of tree-width 2014 spring annual meeting of the KMS, Wonju University	25, Apr, 2014
Characterizing width two for variants of tree-width 6th GRASTA, Institut d'Etudes Scientifiques of Cargse, Corsica, France	31, Mar, 2014
Characterizing width two for variants of tree-width	

Seminar at Utrecht University in Utrecht, Netherlands	28, Feb, 2014
Characterizing width two for variants of tree-width Dagstuhl seminar on Graph Modification Problems, Dagstuhl, Germany	14, Feb, 2014
Unavoidable vertex-minors in large prime graphs 12th Korea-Japan Workshop on Algebra and Combinatorics, KAIST	23, Jan, 2014
Tree-like structure of distance-hereditary graphs Seminar at Hanyang University Hanyang University	29, Nov, 2013
Characterizing width two for variants of tree-width NIMS Workshop, Daejeon, Korea	28, Nov, 2013
Tree-like structure of distance-hereditary graphs 60th KPPY Combinatorics Workshop, Kyungbook University	9, Nov, 2013
Unavoidable vertex-minors in large prime graphs 2013 annual meeting of the KMS University of Seoul	25, Oct, 2013
Unavoidable vertex-minors in large prime graphs Discrete Math Seminar at KAIST	4, Oct, 2013
Unavoidable vertex-minors in large prime graphs Seminar at University of Hamburg in Hamburg, Germany	5, June, 2013
Graphs of small rank-width are pivot-minors of graphs of small tree-width Seminar at Masaryk University, Brno, Czech	20, May, 2013
Excluded vertex-minors for graphs of linear rank-width at most k STACS 2013, University of Kiel, Kiel, Germany	28, Feb, 2013
Graphs of small rank-width are pivot-minors of graphs of small tree-width 2012 annual meeting of the KMS, Daejeon, Korea	6, Oct, 2012
Graphs of small rank-width are pivot-minors of graphs of small tree-width 2012 SIAM Discrete Math Conference Dalhousie university, Halifax, Canada	22, June, 2012
Binary matroid and fundamental graph Seminar for graduate students KAIST, Daejeon, Korea	1, May, 2012
Pivot-minors and vertex-minors of trees and paths 5th GROW, KAIST, Daejeon, Korea	28, Oct, 2011

**TEACHING
EXPERIENCES**

<i>Teaching assistant</i> : Introduction to Graph Theory (MAS477)	Fall 2014
<i>Teaching assistant</i> : Discrete mathematics (MAS255)	Spring 2014
<i>Teaching assistant</i> : Introduction to Graph Theory (MAS477)	Fall 2012
<i>Teaching assistant</i> : Discrete mathematics (MAS255)	Spring 2012
<i>Teaching assistant</i> : Introduction to Graph Theory (MAS477)	Fall 2011
<i>Teaching assistant</i> : Discrete mathematics (MAS255)	Spring 2011