Rustam Azimov

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Research interests

Graph algorithms, Path search algorithms, GraphBLAS API, Graph databases, Query languages.

GPGPU, Parallel computation, High performance computing.

Linear algebra, Efficient matrix operations, Matrix multiplication, Sparse matrices.

Graph theory, Formal grammars and formal languages theory.

Machine learning, Big data, Datalog.

Education

2012 – 2016 B.S in Mathematics and Computer Science, Saint Petersburg State University, Russia, Thesis title: Syntax errors detection in dynamically generated code, Advisor: Grigorev Semyon.
Mathematics and Mechanics Faculty

2016 – 2018 M.S in Mathematics and Computer Science, Saint Petersburg State University, Russia, Thesis title: Graph parsing by matrix multiplication, Advisor: Grigorev Semyon.
Mathematics and Mechanics Faculty

2018 – expected 2022 Ph.D. in Mathematics and Computer Science, Saint Petersburg State University, Russia, Thesis title: Context-free path querying using linear algebra, Advisor: Grigorev Semyon.
Mathematics and Mechanics Faculty

Employment

2017 – 2022 JetBrains s.r.o., researcher at JetBrains Research laboratory, Saint-Petersburg.

2020 – now Saint Petersburg State University, assistant lecturer at Department of Information and Analytical Systems, Saint-Petersburg.

Teaching

Courses Machine Learning, Graph Theory, Formal Languages Theory.

Software contribution

CFPQ_PyAlgo One of the creators of the framework for developing, testing and benchmarking algorithms that solve Formal-Language-Constrained Path Problems, such as Context-Free Path Querying and Regular Path Querying. All algorithms are based on the GraphBLAS API that allows one to represent graphs as matrices and work with them in terms of linear algebra.
https://github.com/JetBrains-Research/CFPQ_PyAlgo

YaccConstructor Created an algorithm for Context-Free Path Querying with using matrix multiplication, and some optimizations like GPGPU, parallel processing, sparse matrix representation; added syntax error detection in the algorithm for static analysis of dynamically generated code.
https://github.com/YaccConstructor/YaccConstructor

Conferences and publications

ICLP 2022 (accepted to publication) Jumping Evaluation of Nested Regular Path Queries, Joachim Niehren, Rustam Azimov, Sylvain Salvati, 2022.
The 38th International Conference on Logic Programming (expected in August 2022)

Scientific and Technical Journal of Information Technologies, Mechanics and Optics 2021 Context-Free Path Querying with All-Path Semantics using Matrices with Sets of Intermediate Vertices, Rustam Azimov, Semyon Grigorev, 2021.
Scientific and Technical Journal of Information Technologies, Mechanics and Optics, vol. 21, no. 4, 2021

GRADES-NDA 2021 Context-Free Path Querying with All-Path Semantics by Matrix Multiplication, Rustam Azimov, Ilya Epelbaum, Semyon Grigorev, 2021.
Graph Data Management Experiences and Systems (GRADES) and Network Data Analytics (NDA) 2021

VLDB-PhD 2021 Context-Free Path Querying in Terms of Linear Algebra, Rustam Azimov, 2021.
PhD workshop at the 47th International Conference on Very Large Data Bases, 2021

ADBIS 2020 Context-Free Path Querying by Kronecker Product, Egor Orachev, Ilya Epelbaum, Rustam Azimov, Semyon Grigorev, 2020.
The 24th European Conference on Advances in Databases and Information Systems (ADBIS), 2020

GRADES-NDA 2020 Context-Free Path Querying with Single-Path Semantics by Matrix Multiplication, Arseniy Terekhov, Artyom Khoroshev, Rustam Azimov, Semyon Grigorev, 2020.
Graph Data Management Experiences and Systems (GRADES) and Network Data Analytics (NDA) 2020

Programming and Computer Software 2019 Path Querying with Conjunctive Grammars by Matrix Multiplication, Rustam Azimov, Semyon Grigorev, 2019.
Programming and Computer Software, 2019, Vol. 45, No. 7, pp. 357–364

GRADES-NDA 2018 Context-Free Path Querying by Matrix Multiplication, Rustam Azimov , Semyon Grigorev, 2018.
Graph Data Management Experiences and Systems (GRADES) and Network Data Analytics (NDA) 2018

BiATA 2017 Poster: Graph Parsing Application for Bioinformatics Problems, Rustam Azimov, Semyon Grigorev, 2017.
Bioinformatics: from Algorithms To Applications (BiATA) 2017

PLC 2017 Path Querying and String Generation Problem, Rustam Azimov, Semyon Grigorev, 2017.
Program Languages and Compilers (PLC) 2017

CIMPS 2015 An Optimization of a New Algorithm for Lossless Image Compression, Rustam Azimov, Vladimir Glazachev, 2015.
Young Researchers Colloquium on the organization of information and system programming (CIMSP) 2015

Additional education

2013 – 2016 Modern Computer Science.
Saint-Petersburg Computer Science Center

Technical skills

Programming Languages Python, C, C++, F#, R, Datalog

GraphBLAS libraries SuiteSparse:GraphBLAS, pygraphblas

GPGPU Cuda, OpenCL.

Nvidia Cuda Toolkit cuBLAS, cuSPARSE.

Language skills

English Proficient

Russian Native

German Beginner