# Martin Drozdík

Curriculum Vitae

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#### Research interests

- Evolutionary computation
- Computational geometry
- Multi-objective optimization
- Differential evolution

# Key skills

MATHEMATICS Algorithm design, graph algorithms, probability theory, statistics.

C++ 6 years active experience. Deep interest in best practices and C++11/14. Experience with high-performance code and parallelization.

QT 3 years active experience, especially in GUI design and implementation.

## IT skills

Operating systems LINUX / UBUNTU / BASH

Office MERCURIAL, LIBREOFFICE, LATEX, INKSCAPE

Programming Valgrind, Qmake, Matlab/Octave, SQL, R, Eigen

Web development JAVASCRIPT, HTML, CSS



# Awards and scholarships

Monbukagakusho, Scholarship of the Japanese Ministry of Education, Awarded to two research students from Slovakia annually. Selection based on research plan quality and recommendation from a prospective supervisor from the Japanese side.



IEEE Young Researcher Presentation Award, IEEE Session, Niigata.

**Erasmus**, Full scholarship and tuition for 6 months (University of Pisa).

Dean's motivational scholarship, top 10% of class, awarded 4 times.

#### About me

I have a very strong sense of beauty and quality. I aim for the highest efficiency in everything I do, and I always strive to do The right thing.



# Professional experience

Doctoral student, Tanaka-Hernan-Akimoto laboratory, Shinshu University, Nagano, Japan,

Multi-objective optimization using evolutionary computation.

- Developed a method to keep track of non-dominated individuals (NDI) in the population of an evolutionary multi-objective optimizer after each change to the population. This method performs up to 400 fewer comparisons than the brute force method and works up to 4 times faster than the state-of-the art divide and conquer algorithm (which cannot keep track of NDI at all times).
- Studied:
  - self-adaptation and learning within multi-objective evolutionary algorithms
  - rotational invariance of multi-objective optimizers.
- Oeveloped:
  - high-performance, multi-dimensional, geometric data structures (C++)
  - graphical application to analyze data from numerical experiments (QT)
  - a library of multi-objective evolutionary algorithms (C++).
- Peer reviewed at top journals and conferences (EJOR, IEEE TEVC, GECCO).

Open source project contributor, EIGEN: C++ linear algebra library. Recently my first bug-fix was merged.



2011

2010

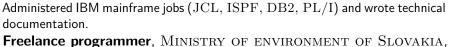
2008

Researcher, DOLPHIN TEAM, INRIA, Lille, France,

Exploration of differential evolution parameters (C++/QT).

- Performed numeric experimentation using the Grid5000 cluster computer.
- Analyzed and interpreted tens of GB of data using a single laptop computer.

Programmer, ACCENTURE TECHNOLOGY SOLUTIONS, Vienna, Austria. Administered IBM mainframe jobs (JCL, ISPF, DB2, PL/I) and wrote technical



Bratislava, Slovakia, Digital archive of news articles.

- Implemented a data entry tool for teammates who classified the articles.
- Designed and implemented an application to browse >2000 pdf files (C++).



# Freelance math tutor.

Teaching linear algebra and mathematical analysis, mostly in one on one lessons.

**Volunteer**, Initiative to preserve environment in Bratislava old town.

Helped save the park on Belopotockeho street from being replaced by an apartment building by collecting over 1000 valid petition signatures and participating in legal battles (park.estranky.sk).

# Languages

English Advanced 10+ years, IT and mathematics terminology. Japanese Intermediate Living in Japan for 3 years, actively studying.

German Intermediate 8 months on an IT project in Austria.

Italian Intermediate Studied mathematics and economics in Italian.

French Beginner Actively studying. Slovak/Czech Native

# Major publications

2015 M. Drozdik, H. Aguirre, Y. Akimoto, and K. Tanaka

# Comparison of Parameter Control Mechanisms in Multi-objective Differential Evolution

Presented at the *Learning and Intelligent Optimization (LION9)* conference, To appear in *Lecture Notes in Computer Science, volume 8994.* 

2014 M. Drozdik, H. Aguirre, Y. Akimoto, and K. Tanaka

## Computational Cost Reduction of

#### Non-dominated Sorting Using M-front

In IEEE Transactions on Evolutionary Computation.

2014 M. Drozdik, K. Tanaka, H. Aguirre, S. Verel, A. Liefooghe, and B. Derbel
An Analysis of Differential Evolution Parameters on
Rotated Bi-objective Optimization Functions

Presented at the Simulated Evolution and Learning (SEAL2014) conference, published in Lecture Notes in Computer Science, volume 8886.

2013 M. Drozdik, H. Aguirre, and K. Tanaka

# Attempt to Reduce the Computational Complexity in Multi-objective Differential Evolution Algorithms

Presented at the GECCO 2013 conference, published in Proceedings of the 15th Annual Conference on Genetic and Evolutionary Computation.

# 2015

2010

2008

#### Formal education

Doctorate, Engineering (Computer Science),

Department of Mathematics and System Development, Shinshu University, Nagano, Japan.

 $\label{thesis:eq:optimize} \mbox{Title of thesis: Improvements in Understanding and Performance of Multi-objective Differential Evolution}$ 

Master, APPLIED MATHEMATICS,

Comenius University in Bratislava, Slovakia,

Graduated with honors.

Title of thesis: Stochastic Processes in State Space Form and ML Estimation of Their Parameters

**Erasmus exchange student**, MATHEMATICS AND ECONOMICS, University of Pisa, Italy.

Bachelor, APPLIED MATHEMATICS,

Comenius University in Bratislava, Slovakia,

Graduated with honors.

Title of thesis: Strange Functions in Mathematical Analysis



## Free time

Football I play regularly.

Videogames Real time strategy.

Sci-fi literature Especially Robert Heinlein, Arthur C. Clarke, and Joe Haldeman.