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RASMUS FONSECA

SUMMARY

Computer science Ph.D. with extensive experience in algorithms, statistical analysis, machine learning, computational geometry, data visualization, and high-performance simulations. Builds well-documented, scalable, and tested software that solves some of our hardest known problems. Passionate about disseminating technical topics to experts and novices alike.

EXPERIENCE

Stanford University — Visiting Scholar

JANUARY 2016 - PRESENT

- Collaborated with two Nobel laureates to perform computational analysis of high-profile drug targets. Specifically, simulation methods from the Levitt lab were applied to interpret biochemical experiments on GPCR proteins from the Kobilka lab. Machine learning methods were applied to analyze drug binding sites.
- Built shareable, online, interactive, visualization tools for interpreting time-varying networks and used them to compress and analyze molecular dynamics trajectories. The framework is now used in several publications and getting integrated in tools under the GPCRmd consortium.
- Designed novel robotics-inspired motion planning algorithms which enable the investigation of hypotheses about large-scale molecular motions.

University of Copenhagen — Postdoc

APRIL 2014 - DECEMBER 2015

- Designed and implemented state-of-the-art euclidean high-dimensional exact and heuristic Steiner tree optimization algorithms in C++ that outperforms all similar methods.
- Implemented the core of the probabilistic Markov-Chain Monte Carlo simulation program, Phaistos, in collaboration with Dept. of Biology.
- Supervised 15 bachelor projects and planned and taught the courses 'Programming Massively Parallel Hardware', 'Python Programming' and 'Interactive Data Exploration'.
- Secured a 600.000USD / 4 year fellowship from the Novo Nordisk Foundation / Stanford BioX to study GPCR dynamics using computational methods.

INRIA Saclay / SLAC Stanford — Postdoc

DECEMBER 2012 - MARCH 2014

- Adapted robotics-based methods for RNA molecules and established their application to interpret nuclear magnetic resonance data.
- Refactored existing C++ framework for robotics-based molecular modeling making it accessible for incoming graduate students.

University of Copenhagen — Various teaching positions

2005 - 2012

- Held lectures in and helped plan the courses 'Data Structures - Theory and Practice', 'Functional Programming', 'Computer Science Theory', 'Computational Geometry', 'Advanced Algorithms', 'Algorithms and Data Structures', 'Introduction to Programming', and 'Protein Engineering'.
- Held classes and corrected assignments (TA) in 'Object-Oriented Programming and Design', 'First Year Project', 'Machine Architecture', 'Algorithms and Data Structures', 'Advanced Algorithms', and 'Linear Algebra'.
- Implemented the educational visual microarchitecture simulator, KredsDesign, for the Machine Architecture course in Java.

EDUCATION

University of Copenhagen — Ph.D. degree

SEPTEMBER 2009 - NOVEMBER 2012,

Focus on computational biology. Ten month visit at UC Santa Cruz. Six publications.

University of Copenhagen — Master's degree (cand. scient.)

DECEMBER 2005 - MAY 2009,

Major in computer science. Two publications.

University of Copenhagen — Bachelor's degree (bach. scient.)

AUGUST 2001 - NOVEMBER 2005,

Major in physics and minor in computer science

TECHNICAL SKILLS

- C/C++; CUDA, lapack, GSL, Eigen, Intel MKL, FANN (5 years)
- Python; numpy, pandas, scikit-learn, pyplot, seaborn (5 years)
- Java; Java3D, Swing, JavaFX (10 years)
- JavaScript; D3.js, Three.js (5 years)
- Unix data management; bash, sed, grep, make, ssh, rsync (15 years)

See <https://rasmusfonseca.github.io> for a list of my open-source projects.