> Federico Vaggi, PhD
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Education

2006-2010 **PhD, Systems Biology**; IFOM-IEO institute, University of Milan

2004-2006 **MSc, Bioinformatics**; University of Milan, Bicocca

2000-2004 **BSc, Physics**; Imperial College, London

Experience

Researcher: Fondazione Edmund Mach (2013-2016)

I work on difficult problems in biology and science using quantitative approaches. For example:

- Understanding the role of stem cells in breast morphogenesis using fractals and l-systems: **code** and **paper**
- Fixing networking between researchers at scientific conferences using speed dating and graph theory: **Harvard Business Review**, **code** and **paper**
- Using network reconstruction to understand the crosstalk in the insulin pathway: **paper**
- Network analysis high throughput microscopy screen to identify connections between cell cycle and cell polarity. Currently under review in Molecular Systems Biology.
- Statistical analysis to improve peer review and publishing time. Ongoing project in collaboration with the **eLife** editorial team.
- Develop algorithms to improve maximum likelyhood estimation for exponential family models: **paper**

Post-Doc: COSBI (Microsoft Research - University of Trento Center for Computational Biology) (2010-2013)

I worked with Dr. Csikasz-Nagy (ongoing collaboration) to study cell polarity using high throughput/high content microscopy in fission yeast in an **HFSP funded project**.

- Stochastic modeling to study formation and role of discrete nodes on fission yeast cortex: **paper**
- Using bioinformatics and graph theory to identify key linkers between different processes: **paper**
- Worked alongside the programming team to develop tools for network analysis: **software**

Technical Experience

I was not satisfied with any of the existing libraries to perform multi-objective optimizations in Python, so I built my own toolbox, focused on problems with differential equations: **SysBio**

I am highly active in the scientific python community, and won the best poster award at EuroScipy 2014, served as a member of the scientific committee at EuroScipy 2015 and was chosen as the scientific chair for EuroSciPy 2016.

I also contribute to **scikit-learn** and teach scientific python and reproducible data analysis courses to graduate students.

Programming Languages and Technical Skills:

- **Python:** Most of my research is done using the scientific Python stack, and I know all the key packages (IPython, Pandas, Numpy, Scipy, sympy, scikit-learn, matplotlib) very well. I also try to contribute back to the community as much as I can, through organizing conferences, teaching, and contributing to open source projects.
- **MATLAB:** Used it extensively during my PhD, but moved on to Python almost completely. I am quite rusty with the language, but still know it very well.
- **C and C++:** I use both languages to write tight numeric loops when it's not possible to do so in Numba or Cython, or when a particular library does not offer Python wrappers.
- Beginning to learn **Scala**. I started the course offered on Coursera to teach myself a functional/JVM language, but I have not done any serious work with it other than a few problems on project Euler.

Mathematical Tools:

- Machine Learning
- Differential Equations
- Stochastic Modeling
- Graph Theory
- Data Analysis
- Statistics (Bayesian and Frequentist)
- Data Visualization

Biological Experience:

- Cancer Biology
- Reaction Kinetics modeling
- Proteomics and Network Analysis
- Cell Polarity and motility

Professional Experience:

In my research, I have worked with teams of both technical and non-technical collaborators, and believe that the best results come when deep domain knowledge is combined with technical and mathematical expertise. In multi-disciplinary teams, I often worked as an 'interpreter', bridging the gap between biologists and computer programmers, and this has given me extensive experience presenting complex analysis in an intuitive way.

I enjoy working in a technical role, but, if necessary, I take on responsibility and lead a team when I'm the best person to do so. I care a lot about self improvement and learning new things, and I take every occasion I can to learn something new, whether through courses online on Coursera, or by pursuing side projects such as Kaggle competitions or blogging about data analysis.

References