

## Collaboration with ETH Zürich, Switzerland

As a young tenure-track researcher, it is crucial for me to establish national and international recognition. My primary research focus is in designing new and efficient algorithms for solving large-scale optimization problems. One of the application domains my work had a huge impact already is large-scale machine learning (ML). My theoretical results and recently proposed algorithms are now considered as state-of-the-art approaches for solving a certain class of optimization problems in ML.

**Professional and Personal Goals.** ETH Zürich is in the top 10 universities in the world. Moreover, in Europe is also known as one of the best technical schools. Their programs are excellent and widely recognized across the world as one of the best. If my application would be founded, I will allow me to establish new and strengthen existing contacts with top researchers. I am confident that this will lead to new and exciting research directions for my research team and me. Visiting the computer science at ETH and talking to Ph.D. students (who serves as teaching assistants) will also give me a new perspective and understanding of their excellent programs in data management, data science, and machine learning. For my personally, being able to see a strong and coherent academic program from their perspective would give me new views on teaching.

**Excepted Short-term Outcomes.** I would split the short-term outcomes into three categories:

- **Research outcomes.** I expect to start new research projects during my stay with Prof. Thomas Hoffman and members of his research team. Let me remark that Prof. Hoffman's team currently includes two postdocs and 10 Ph.D. students and professionally I am aware of the research results of five of them, and similarly, they are aware of my research as we are working in somehow similar directions. However, there are key differences (my results are more from an optimization perspective, and their focus is more on statistical properties). I firmly believe that by closely collaborating with them, new exciting results will be obtained which will have potentials to transform the future of large-scale ML.
- **Teaching and curriculum outcomes.** Because of my strong interest and passion in teaching, I have volunteered to be part of the data sciences curriculum committee organized and lead by Brian D. Davison. I cannot stress enough that the data science is becoming more and more important nowadays and in the future. All the great universities across the world are developing data science curriculums to be able to educate future data scientists. It is now projected that there will be a huge demand for a skilled (and well paid) data scientists on the market over the next decades. The short term goal would be to transfer ideas from ETH to improve the teaching of principles of data sciences here at Lehigh.
- **Increasing Lehigh international visibility.** Lehigh University is not known in Europe much. When I was a Ph.D. student, I became aware of Lehigh mainly due to the work of top researchers in my field, namely Tamas Terlaky and Katya Scheinberg. Also, it is unfortunate, that we are not getting many graduate students from "Europe". I would like to invite Ph.D. students from ETH to visit our OptML group here at Lehigh (for e.g. two weeks long intensive research visits) so they can mention our programs back home to undergraduate and master students.

**Excepted Long-term Outcomes.** During the visit, I want to start building good relations and research collaboration with senior Ph.D. students who are having a strong perspective to obtain a faculty position at top universities across the Europe. It will allow me to have (maybe in 3-5

years) an established collaboration with a few top foreign universities. This can be beneficial also for advertising and increasing visibility of Lehigh, getting great students to our graduate programs and overall improving the quality of research and teaching at Lehigh.

Also, I hope that by learning from ETH excellent programs, we at Lehigh will build an attractive data science program which will be nationally recognized as one of the best. I know we have the potential to do it, but we shouldn't rediscover it from scratch. We should see what is done at top places and took the good ideas and implement them at Lehigh. And I hope that by visiting ETH I can get contacts on faculty and TAs and see what and how should we transform Lehigh to have a strong data science presence.

**Plan During the Stay.** My plan is to visit *Prof. Thomas Hoffman* and his research team at **The data analytics lab; Department of Computer Science; ETH Zürich; Switzerland.**

I plan to spend mornings and early afternoons by working on new research directions, interacting and meeting with faculty, post-docs and Ph.D. students. I already know there two Ph.D. students somehow closer, so I hope they will help me to achieve my plan by helping me to organize meetings and create a preliminary schedule for my stay, even before I will come to ETH. Afternoons, I would like to spend by gathering information about their programs, obtaining (non-private) teaching materials and collecting ideas, experiences, successes and pitfalls they have had when building the programs. At the evenings, I plan to strength the social bounds over the dinners. During the night, I will make detailed notes about the new ideas I have learned and push the new research discussed during the day.

**Preparation and Planning.** Before going to ETH, I would like to meet with Brian D. Davison and few another faculty members to gather more information about our courses related to data science. With the help of the two Ph.D. students at Prof. Hoffman's lab, I would like to schedule most of my stay, so I do not need to deal with that overhead once I arrive at ETH. Also, by knowing the two students there somehow closer, they can help me to choose the dates of my visit when most of the researchers will be around.

**Steps After Returning to Lehigh.** I would like to meet with Brian D. Davison to share the ideas I have obtained from faculty and TAs at ETH, related to our goals. I would also like to deliver a presentation at the curriculum committee meeting about the data science programs at ETH and give my view what we can do to enrich our programs and to improve the teaching of data science at Lehigh.

From research side, I would continue working on projects started at ETH, include my Ph.D. students into those new research directions and continue strengthening newly established connections.

**Budget.** My preliminary starting date of the visit should be at the end of May/beginning of June. The preliminary budget is provided below.

air fare	800 USD
accomodation	1,600 USD
local transportation	90 USD
meals	1,500 USD
<b>Total:</b>	<b>3,990 USD</b>



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Zurich, January 26<sup>th</sup> 2017

RE: Lehigh University Faculty Grants for International Connections

Dear Martin,

I would like to invite you as a non-paid research fellow for two weeks, at Data Analytics Lab, Department of Computer Science, ETH Zürich (ETH Zürich is one of the top 10 universities in the world).

It would be a pleasure for my team and myself to collaborate with you intensively during your stay (and afterward) in the area of machine learning and data science.

I am also aware that at Lehigh University, you try to develop a better data science curriculum and I would like to share the knowledge, experience and expertise we have in this area (our programs in data management and machine learning are excellent).

I am very excited about this opportunity for the both of us. Given your and my area of expertise, I firmly believe, that our collaboration will lead to novel results in the field of machine learning and huge-scale convex and non-convex optimization.

Once you received the grant, we will pick specific dates during summer 2017. During your stay at ETH, we will provide you with a desk and an internet connection.

I am looking forward to collaborating with you and I am confident that you and Lehigh University will considerably benefit from this research visit, from the contacts and interactions with our faculty, visitors, and Ph.D. students.

If you have any questions, please feel free to contact me.

Kind regards,

Prof. Thomas Hofmann