

Report on Research Work and Scientific Merits (5 March 2020)

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In this report attached to my application for the position of a Senior Lecturer within my own organization, I describe my whole academic career chronologically from its beginning to this day (5 March 2020) and into the future of my current dreams and hopes. I refer to my earlier publications with the labels used in the List of Publications which the reader will probably find as a separate attachment of the job application. In Section 4, I describe the status of some works-in-progress which cannot be included in the List of Publications as per instructions of the Academy of Finland as they have not yet completed the peer-review process.

1 Early Works

My Master's thesis [G1] written in Finnish was one deliverable of a development project jointly funded by Tekes (later known as Business Finland), my first employer Numerola Oy (Ltd.), two other local industrial partners, and our university department. I was hired by the department for 6 months to deliver my own thesis and a confidential additional part with software for Numerola. That period of interesting and meaningful work inside the academic world was so enjoyable that I have never since thought of career paths that are not intimately related with research.

My thesis supervisors considered one of the two case studies in my thesis to be promising enough to be translated to English and converted into a draft of my first real article [A1]. At that time, any mathematics in our works were written by my senior co-authors and not much understood by me – my part in the early works revolved around programming and integrating computational software. I put the article together, though, and was responsible for its path to being published. The whole peer-review process and getting the first publication accepted convinced me that I was on the correct path working at the university. The rest of my part in the project was documented without peer-review as department reports [B1] and [B2]. During this time I started to learn more mathematics and I took some first steps into the exciting world of multiobjective optimization methods.

Meanwhile, I got involved in teaching activities which admittedly grew to be the greater of my two loves towards the academic world. There is a gap in my publication list while I was teaching and re-inventing a couple of our core Bachelor level courses. Those kind of teaching activities took a lot of time and effort when doing it the couple of first times.

After a few years in teaching and completing my own Master's degree, I came back to research in another project which delivered the department reports [B3], [B4], and [B5], and peer-reviewed conference articles [A2], [A3], and [A4]. As an afterthought, we should have aimed much higher in the project. After the 2-year project I still had only 4 peer-reviewed articles in my CV, of which 3 were just conference papers. I learned a lot from the project, including the fantastic world of machine learning and artificial neural networks in particular. And so much about paper machines, hydraulics, passive radar systems, and management of industrial collaboration projects. Yet, the painfully biggest and most valuable learning is: "publish fast, publish all, publish high in the ranks". Meanwhile, I was teaching, which took a lot of time.

2 Doctoral Studies

My doctoral studies started as late as 2010 because I had been quite content with the appeals of teaching and project work. The goal in my doctoral work was to combine my two earlier niches – multiobjective optimization and machine learning using artificial neural networks. I started with a scholarship with no obligations other than doctoral studies, but before the scholarship year was at its end, I was called to teach again, and I took up student advising. Anybody could have seen in their respective crystal balls that the thesis undertaking would be a long one.

Not long after the start, there was an interesting interlude into the field of informetrics published in the article [A5] which contains the background story in its Introduction. Informetrics, document clustering, and later natural language processing, became one love of mine among many. The future might hold more evolved publications on the topic if research opportunities happen to present themselves. At the moment I am supervising two Master's theses on natural language processing which satisfies this craving for now.

One intermediate conference paper [A6] on my thesis topic was published. Then, finally, an abruptly stopped train of thought appeared as the monograph [C1] (listed also as [G2]). I maintain that the section that develops, applies, and evaluates the informetrics work in [A5] is golden and worth my professional pride forever. Other than that golden part, I regard my thesis mostly as a research agenda for the next kid who has the interest and especially the time to continue from where I left off. Having analysed my own path afterwards, I think I know how I can improve the chances of my own future students to achieve pure gold with less tears.

3 Meanwhile

While my own dissertation was being reviewed, I joined forces with another doctoral candidate writing articles [A7] and [A8] that were included in his dissertation. During this intensive undertaking, I learned a great deal about 5G networks which is nice and interesting and valued by the industry, I believe. Much more importantly, I discovered my actual calling within the scientific community. I want to excel in exactly this role that I believe I already master, too: I love being the best "supporting researcher" imaginable – the coach, the tutor, the facilitator of becoming an expert in a topic that a person loves. Around the same timeframe I had a supporting role also in the conference paper [A9] included in yet another PhD thesis.

4 Today and the Future

Being a teacher to the core, I want to contribute to educational research and especially that of higher education. My humble opening as a co-author was [A10] presented in the Frontiers in Education Conference (FIE) 2018. I am currently contributing as co-author to 2 papers for FIE 2020 (abstracts already accepted and the papers being finalized with full speed).

The motto I learned the hard way back in the early days ("publish fast, publish all, publish high in the ranks") I now put into practice with the skills and determination learned since. Observe: From the first day of project application pre-planning I am involved as senior researcher in our current project that published its first deliverable [A11] in Nature Communications soon after the project started. The second submitted one is available only as a preprint [B6] today, but I believe it is solid work that will get published after also the reviewers see that we got it right. A third paper by my very own (first official) doctoral student is now submitted to a very prestigious machine learning conference and we are waiting for reviews with sincerely high hopes. Much of this wonderful speed is due to our principal investigators who are seasoned professors, and it is factually the PhD students doing the work, but I am thus even more proud of my own role as one enabling part of the great teamwork and learning experience for us all.

I will love the moment when the following will be in my official list of publications. Alas, it is not yet today:

- A novel algorithm for redirected walking in virtual reality. Based on a Master's thesis under my supervision; manuscript finished within days or weeks now, prepared for the best journal in the field (with my greatest confidence of success... hands are trembling to get the first reviews).
- Machine learning tool for dyslexia detection from eye movements. Based on a Master's thesis under my supervision; manuscript mid-way with convincing results already from the thesis.
- Gamification of a technical university course. My own next *magnum opus* only in my head for 5 years. Will be mind-blowing but pending all that other work.

5 Vision

In the future, as soon as possible, I want to get new doctoral students under my official supervision. I know I can make them excel as experts from my favorite position as a coach. I want to get the quality of our Master's theses high enough to be publishable in journals with less additional work than apparently needed at the moment. The efficiency of our whole lot needs to be improved, and I think the means to achieve that are much more related to skills in teaching, curriculum design, and leadership, than skills in research per se. I really wish I will one day become a Senior Lecturer who is officially eligible to attend to such tasks. Thus I apply.