

RESEARCH VISIT REPORT – MOBILITA 200

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In the period beginning on June 2, 2014 and ending on September 1, 2014 I was a Visiting Research Associate in the group of Graham Taylor at the University of Guelph, Ontario, Canada. During my stay I mainly focused on two topics: Minimum Probability Flow Learning algorithm (MPF) and I was also developing a method for estimating the normalization constant of Markov Random Fields (MRFs).

MPF is a novel method for supervised parameter learning of MRFs which does not require to calculate certain intractable quantities essential for standard Maximum Likelihood learning. Its applicability is however limited by its supervised nature: it cannot be directly used for parameter learning of Deep Belief Networks, which are nowadays used in many state-of-the-art models. My task was twofold: propose and theoretically justify some improvements over the original paper and find a framework in which the MPF could be used even for unsupervised learning.

Normalization constant and marginals are important quantities characterizing MRFs. They are necessary for the inference and the Maximum Likelihood learning but it can be proved that for general models it is very difficult to calculate them exactly and one has to resort to approximations. In the second part of my stay I participated in development of a new approximative method. I proposed several crucial aspects and solved many technical issues.

Both MPF and estimation of the normalization constants are closely related to the topic of my thesis and during my stay I had countless valuable discussions with the other team members concerning directly my thesis. They were all very inspirational and only thanks to my stay in Guelph I could come up with several ideas I plan to further develop and eventually use in the thesis. I remain in contact with all my Guelph colleagues and I am still participating in the research mentioned in the previous two paragraphs, especially in the development of the approximative method for calculating normalization constant of MRFs.