

Traffic modelling using machine learning

Modelling internet traffic at the packet or byte rate is an active area of research. It has been shown in the literature that Markov-modulated Poisson processes (MMPP) are a good candidate model for internet traffic [1]. Several algorithms have been proposed to estimate the parameters of the MMPP in this context. Standard statistical inference/machine learning techniques can be used for this purpose. From a practical standpoint, one difficulty is that it requires prior knowledge about the number of states of the Markov chain. One approach to deal with this problem is to make use of infinite hidden Markov models and its variants. The objective of this master thesis is to design a suitable traffic model and an algorithm to carry out the corresponding inference problem. Special emphasis will be put on devising an inference algorithm that can work “online”.

Good programming skills are a prerequisite. The candidate is expected to be familiar with Markov chains. Willingness to learn some machine learning topics as and when required is also necessary for this project. The candidate is also required to do an extensive literature survey on this topic in the initial phase of his/her thesis.

The thesis will be jointly supervised by Wasiur Rahman Khuda Bukhsh and Bastian Alt.

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References

- [1] D. P. Heyman, D. Lucantoni, *Modeling multiple IP traffic streams with rate limits*, IEEE/ACM Transactions on Networking, 2003.
- [2] Matthew J. Beal, Zoubin Ghahramani, Carl Edward Rasmussen, *The Infinite Hidden Markov Model*, Advances in Neural Information Processing Systems (NIPS) 14, 2002