Additional reading material
Variational inference methods in Bayesian statistics

Lecturer: Georgios P. Karagiannis (georgios.karagiannis@durham.ac.uk)

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This is the independent study material for the students who attend the modules Bayesian Statistics IV (MATH4031) and Bayesian Statistics at masters level

Students attending the module Bayesian Statistics IV (MATH4031) are required to independently study a specific material set by the term 1 lecturer.

There will be a compulsory exam question devoted to that material.

Intended learning outcomes

The students are expected to be able to

- explain, and theorize Variational inference methods in the Bayesian statistics framework.

- derive, produce, and implement Variational inference methods for pacific Bayesian statistical problems/models in the scope of the module.

- combine Variational inference methods with other concepts which are introduced in the Bayesian statistics module in both Michaelmas and Epiphany terms.

Additional reading material (core material)

The additional reading material that students are required to study for the examination is the subsection 10.1 'Variational Inference', in the section 10 'Approximate Inference' from the book

- Bishop, Christopher M. (2006). Pattern recognition and machine learning. New York :Springer

The above additional reading material is (currently) available from the library and Talis system:

- https://library.dur.ac.uk/search~S1?/Y+Pattern+recognition+and+machine+learning&searchscope=1&SC

- https://rl.talis.com/3/durham/lists/3F704A29-C94F-7B1D-49C0-DC78119CFE91.html?lang=en-GB

A PDF copy of that material will be available soon from Talis system when the Library completes the digitalization.

Further illustrative examples (supplementary material)

For those students who wish to study more illustrative examples regarding the concepts in the additional reading material set, I recommend you to have a look at the sub-sections 10.2, 10.3, 10.4, and 10.6 in (Bishop, C. M. ,2006) which present illustrative examples of variational Inference in the Bayesian Normal mixture model, Bayesian Linear regression, Exponential family of distribution, and Bernoulli (or else Logistic) regression correspondingly.

Further exercises (supplementary material)

For those students who wish to do practice by solving more exercises, I recommend you to try to address the Exercises at the end of Section 10 in (Bishop, C. M. ,2006). Solutions to these exercises are available from the following official link

- https://www.microsoft.com/en-us/research/wp-content/uploads/2016/05/prml-web-sol-2009-09-08.pdf

Unofficial links with the rest of the solutions to the exercises in (Bishop, C. M. ,2006) can be found on the internet by searching for instance the keywords 'Pattern recognition and Machine learning solutions' in any internet search engine.

Other

Feel free to ask questions Dr Georgios Karagiannis (georgios.karagiannis@durham.ac.uk) about the content and about the organization of this part of the module.