Additional reading material
Variational inference methods in Bayesian statistics

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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 you are required to study and on which you will be examined is the subsection 10.1 'Variational Inference' in the section 10 'Approximate Inference' from the book

- APA 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 when the Library finish 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 of (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). The solutions to these exercises, as well as summary guidelines, are available from the following links:

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

- Also other unofficial links that you can find on the internet by searching 'Pattern recognition and Machine learning solutions'

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.