Take-home 03 (due April 27)

General Instructions for take-home exams: Please submit your answers as one pdf document, where you describe the logic and procedure you used to solve the problem and where you plot your results. Attach your python or matlab or R scripts and indicate which code solves which problem. Annotate your codes properly. We will evaluate your answers and codes in terms of correctness and clarity. Compress all your relevant files into one compressed file and submit to tengtianyuan@pku.edu.cn.

可以用中文写作业。文件/邮件命名格式请参照“编程语言—本科生/研究生—姓名—学号”。例：“python—研究生—张三—1901111111”。

1. In the seven scientists problem (Lee & Wagenmakers, 2013, Section 4.2), rather than assuming that every scientist has a unique measurement precision (as in Lee & Wagenmakers' book), we may assume that some of the scientists have the same low precision and the others have the same high precision.

(1) Please draw the graphical model for this low-high-precision model.

(2) Please implement this model and compare its goodness-of-fit with that of the original unique-precision model using DIC and WAIC.

2. A second model assumes that all scientists have the same measurement precision.

(1) Please draw the graphical model for this same-precision model.

(2) Please implement this model and draw the posterior distribution of parameter μ (the quantity measured by the scientists, see Section 4.2). Compare this posterior distribution with that of the unique-precision model. If they are different, describe their differences and explain why.

(3) Please compare the goodness-of-fit with that of the unique-precision model using DIC and WAIC.

3. The Deterministic Exemplar Model (DEM) can be considered as a generalized version of the Generalized Context Model (GCM) with an additional deterministic factor γ (see Lecture 06 slides). In Section 17.1 of Lee & Wagenmakers (2013), GCM has been fit to the group data of the categorization experiment of Kruschke (1993).

(1) Please draw the graphical model for DEM.

(2) Please implement DEM and fit it to the group data of the categorization experiment of Kruschke (1993). Compare its goodness-of-fit with that of GCM using DIC and WAIC.

(3) Plot the posterior predictions of GCM and DEM against data.

(4) Plot the posterior distributions of the parameter γ of DEM. Report its 95% confidence interval and explain whether it is consistent with the model comparison results above. (Hint: GCM is nested in DEM.)