Significant Corrections:

1) restructure front of thesis to highlight that main focus is on model selection and emphasize that the PET model discussion is purely to illustrate the methods. As such you will not go in great depth into this application

2) make a comment at the front that you will first discuss a range of model selection methods, however these may not be flexible enough to utilize for the PET application. As such the main focus will be on Bayesian methods.
   - explain and reason this point

3) provide detailed derivation of CESS criterion

4) Comment in more detail on adjusted RISE evidence estimator and choice of $\gamma(\cdot)$. Make reference to the properties of standard RISE evidence estimator and its stable limit theorem - ref. paper

5) Discuss in more detail adaptive MCMC and criterion such as Bounded Convergence and Diminishing Adaptation.

6) Explain in more detail the figures of the PET model selections
   - what the three images represent
   - explain why you expected to see the structure you obtained under your method w.r.t. the application / properties of the experiment. (more detail) especially motivating why lower order models are obtained on the peripheree of scans.

7) explain in more detail what a compartment represents and why you are interested in model selection in this context.

8) provide an example of the completion method.

9) Re-do the experiments for the synthetic study to include B.F. for all sub-model comparisons to show the correct model is selected.

Discussion Points

✓ p. 9 Q1 + Q2
p. 11 Q3 + Q4
} Positron Emission Tomography compartmental model assumptions

p. 19 Q5 + Q6
p. 21
} - model selection
Copula Info Criterion
- what is the "noise level" variable referred to for these compartmental models.

✓ p. 22 AIC vs TIC } - model selection via penalty methods
- comment on continuity conditions

✓ p. 24 Cross Validation } comment on particulars of apply CV methods to PET or compartmental models.

✓ p. 26 Needs a better structuring & intro to Bayes Theorem & Bayesian methods } Discuss the notion of Berger - M Open
- M closed
- M complete
↑ which setting are you in and the implications.

✓ p. 45 Monte Carlo Methods } Discuss features of evidence estimator eq^{n} 4.3

p. 53 MH acceptance probability } Derive this expression for a reversible Markov chain

✓ p. 58 adaptive Markov Chain Monte Carlo
- are there conditions under which one can obtain some notion of an ergodic average?
  - Diminishing adaptation
  - Bounded convergence

p. 71 comment on perfect sampling & coupling from the past for bounded state space models.

✓ p. 76 Generalized Harmonic Mean
- comment on properties of 4.33 and choice of $\gamma(\cdot)$ f^2.

✓ p. 79 Example PET model analysis
Discuss and interpret
- what is being shown here?

✓ p. 81 Discuss in detail the population Monte Carlo algorithm and explain the path sampling evidence estimator.

✓ p. 89 Comment on different SMC resampling strategies and their benefits

✓ p. 90 Discuss optimal choice of backward kernel.

✓ P.94 how do you derive the optimality of Eq. 5.16
- in what sense is it optimal.

✓ P.98 annealing schedule
- can you comment on the optimal choice of annealing schedule.

✓ P.108 Discuss & Derive the representation and properties of the CESS

add derivation

P.118 Discuss and derive the key steps of the asymptotic variance in Eq. 5.35 & Eq. 5.36.

- Comment on how VSMC compares to other packages released over last 2 years
  - Libi
  - Biips
  - ⋮

UNIVERSITY OF WARWICK

Examiners' Joint Report on a Thesis Submitted for a Research Degree

1. NAME OF CANDIDATE: Yan ZHOU (0952281/2)

2. EXAMINATION FOR: Doctor of Philosophy in Statistics (Research)

3. TITLE OF THESIS: Bayesian Model Comparision via Sequential Monte Carlo

4. Date of viva (if held): _____

Please note: On the advice of the Information Commissioner's Office the University is obliged to release this report to the candidate if they request it.

Please refer to the Notes for Completion overleaf before completing this form.

5. Joint report and Examiners' recommendation (see the Guide to the Examination of Higher Degrees by Research)

(a) Please comment on the quality of the thesis:

(b) Please comment on the candidate's performance in the oral examination:

(c) Recommendation (Guidance on completion: For minor corrections please state the agreed time limit here (up to three months). Please note it is the responsibility of the examiners to advise the candidate of the required corrections and agreed time limit, as this will not be communicated by the Graduate School. In the event of a resubmission, please attach a jointly agreed note of guidance which the Graduate School can forward to the candidate, and state the agreed time limit (up to 12 months)).

Signature of Internal Examiner: _____ Date: _____
(or second external examiner where there is no internal examiner)

Signature of External Examiner: Gareth Peters Date: 24/3/2014

6. Examination Advisor's comment on the Viva examination

Signature of Examination Advisor: _____ Date: _____

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(a) Please complete this report as soon as possible after the oral examination (if held) and a final decision has been reached on the thesis. Please return this form to the Graduate School Office and, if a resubmission is required, a separate note of guidance to the candidate.
(b) The examiners' joint recommendation is subject to approval by the University.
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