

Possible CDT projects

Chris Williams

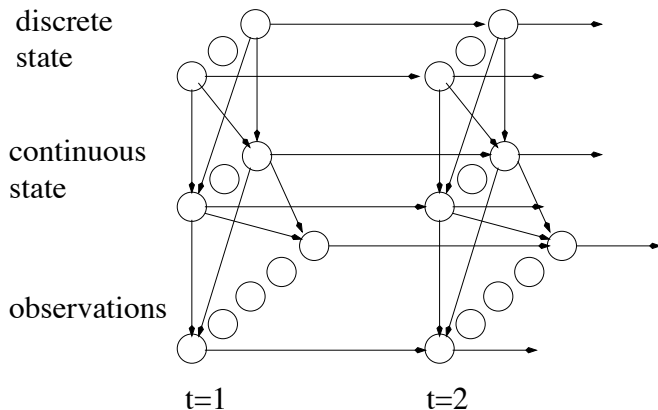
Institute for Adaptive and Neural Computation
School of Informatics, University of Edinburgh, UK

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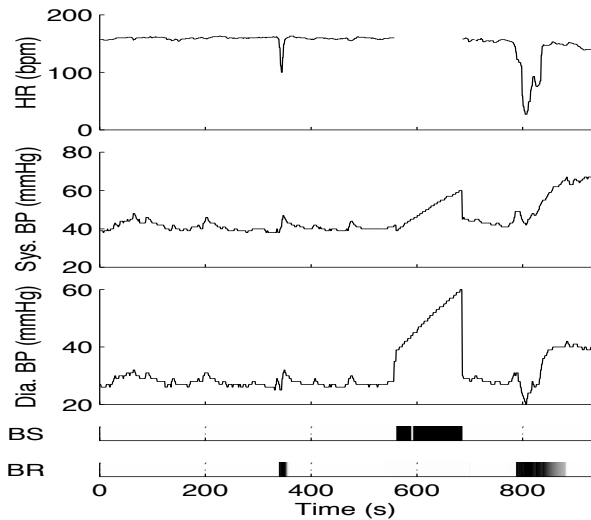
Possible areas

- ▶ Condition Monitoring in Intensive Care Units
- ▶ Model Criticism and Revision
- ▶ Vision as Inverse Graphics
- ▶ Other topics in probabilistic machine learning

Condition Monitoring in Intensive Care Units



Quinn, Williams, McIntosh (2009)



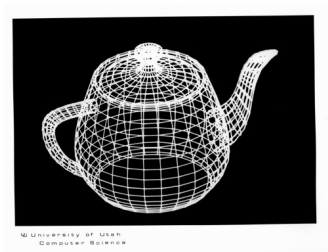
Developing this model

- ▶ Working with Neurological ICU, Southern General Hospital, Glasgow
- ▶ Modelling control inputs, e.g. drug pumps, ventilator settings
- ▶ Possible work on applications to power grid systems

Model Criticism and Revision

- ▶ We spend a lot of time coming up with models and fitting them to data. But how well do they fit? **(Model criticism)**
- ▶ Can look at replicated data from the model and compare it to the real data. Do they differ, and in what ways?
- ▶ Failures provide clues as to how the model should be revised **(Model revision)**
- ▶ For latent variable models can also look at differences between the “aggregated posterior” and the prior
- ▶ Try these methods out on interesting models

Vision as Inverse Graphics



- ▶ It is hard to get rich, annotated image data of object classes
- ▶ Key idea: build a computer graphics stochastic scene generator that models the variability in object *classes*
- ▶ Key advantage: large numbers of images and associated ground truth can be generated

Issues:

- ▶ Building a stochastic scene generator (graphics): model object shape and appearance variability, object co-occurrences and relationships
- ▶ Inference: recognition networks to infer object identities, poses, shape, illumination etc