Project Planning

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Tags	
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Initial Questions

- What are your goals for the year?
  - Learn more about the theory side
  - Improve coding and ML skills
  - Thinking more industry - so more skills focussed
- What courses are you taking? How will you balance your time?
  - QFT, Cosmo, GR - MWF lectures
  - Ideally Tues and Thurs
- What is your background in machine learning?
  - Basically none
- What is your background in programming?
  - Python
- Have you used git before?
  - Yes, but let's work on it
- Have you taken basic statistics? e.g. Bayes' theorem
  - IB statistics
- Do you know what a likelihood is?
  - Yes
- What is your background in probability?
  - Decent
  - Marginalisation
- Do you know what arxiv/inspire is?

    - Yes
- Have you used pytorch before?
    - No
- Do you know what Bayesian inference is?
    - Yes, think more about this
- What is your background in gravitational waves?
    - Theory side strong - linearised Einstein eqn
    - Detection side
- What computing is available?
    - Logging in to clusters
- What computing do we require and on what timescale?

Necessary Steps

- Ability to robustly train neural density estimators
- Peregrine code review and design
- Reference collection
- Understanding of likelihood-based gravitational wave inference
- Ability to run forward simulations of gravitational wave events
- Ability to perform neural posterior estimation on a toy problem
- Application of NPE to gravitational wave inference
- Comparison of gravitational wave posterior estimates to known likelihood-based results
- Collection and continuous update of results
- Final project report and presentation

Interim Report Content

- Gravitational Waves - Detection and likelihood-based inference
- Neural density estimators: training strategies, best practices etc.

- Neural Posterior Estimation performance on example problems
- Clear steps towards coupling NPE with peregrine code