

# 477: Final Project Ideas

Following are some ideas for project directions [in alphabetical order], to be elaborated on in the lectures and then individual meetings with the instructor or the TA. Students will select from the list or suggest their own idea for a project. The latter is welcome and in fact encouraged provided relevance to this course can be established. Projects can vary from the purely theoretical to the purely applied; and any combination thereof.

- Communication over channels with arbitrary or adversarial noise sequences
- Denoiser loss estimators for boosting performance
- Denoising via lossy compression
- Discrete denoising with ‘shifts’ for multi-dimensional data
- Empirical distribution of good codes applied to multi-terminal information theory
- Lossy compression:
  - MCMC approach for large alphabets (e.g., gray-scale image compression)
  - Linearized approximations and a Viterbi-like algorithm
  - Multi-terminal coding scenarios
- LZ-based denoising
- Random sampling for acquisition of context statistics
- Relations between causal and non-causal mismatched estimation and their applications
- Source coding with a side information “vending machine”
- Universal belief propagation
- Universal classification
- Universal filtering vs. Kalman and particle filtering
- Universal reinforcement learning via context tree weighting