Track Seeding with Convolutional Networks

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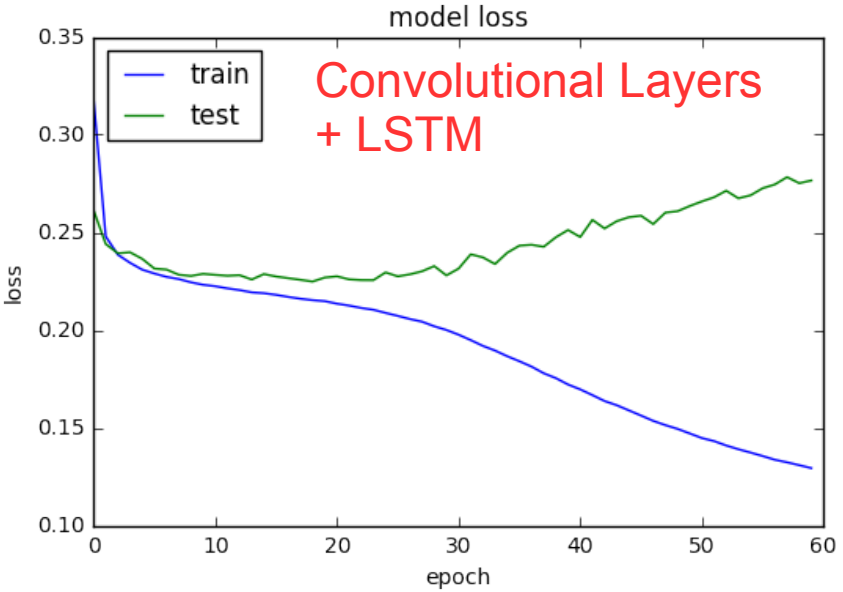
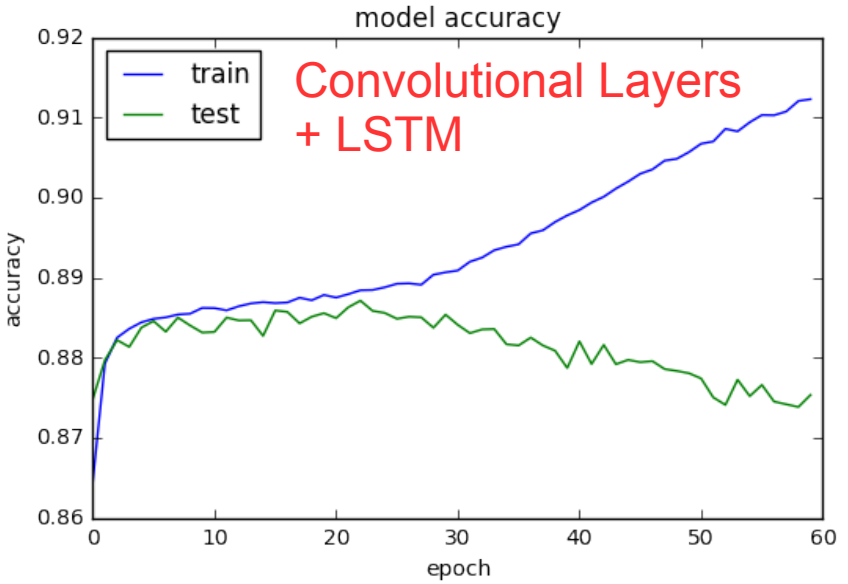
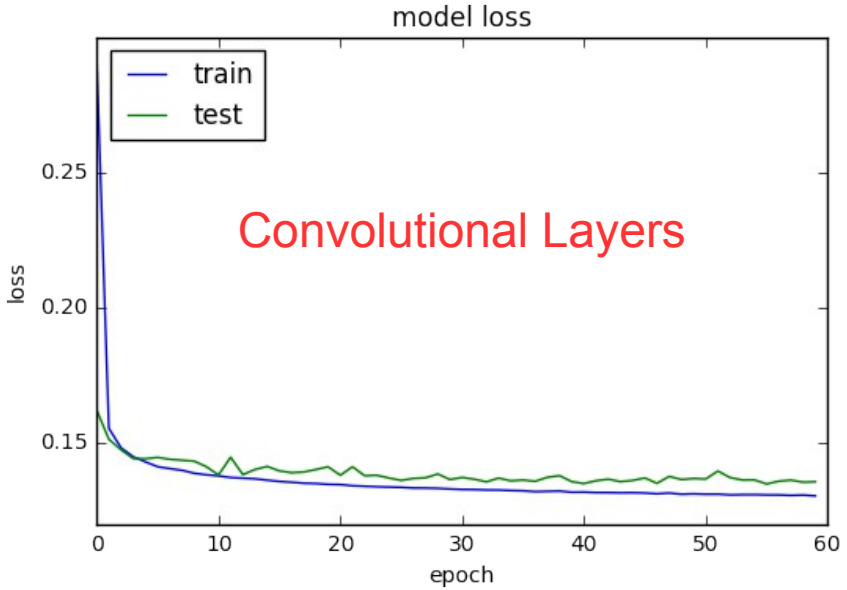
Overview

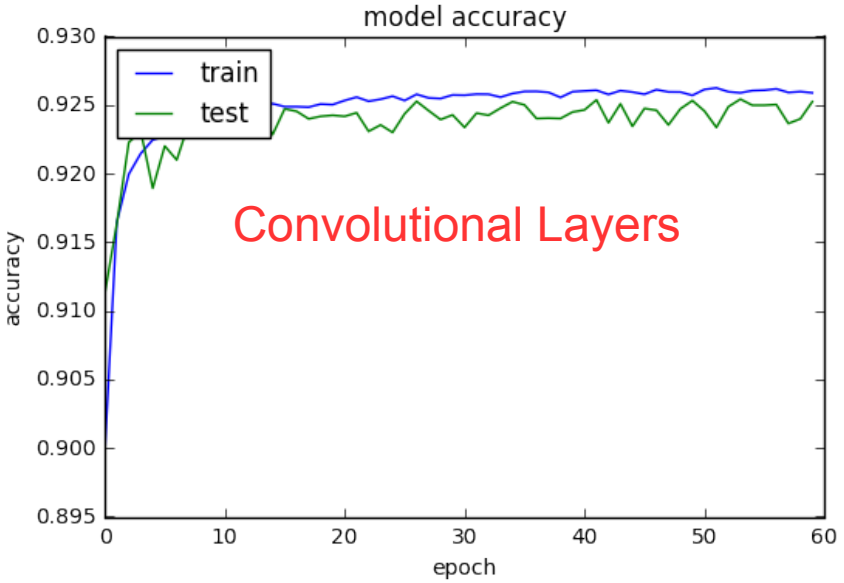
- Use Dustin's network model to extract track parameters from a 5x50 detector.
- The number of tracks is fixed to 6 and the pull distributions are calculated as:
  - $$z_{(Slope\,,\,Intercept)} = \frac{Model\ Prediction - Truth}{\sqrt{\frac{Average\ Validation\ Loss}{Number\ of\ Tracks}}}$$
- A comparison is show between only convolutional layers and convolutional layers + LSTM.

Training Performance

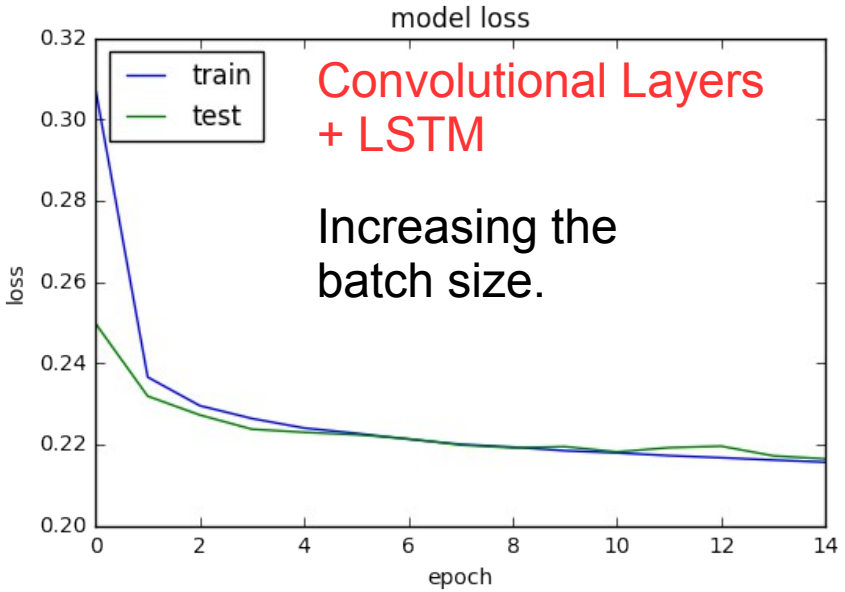


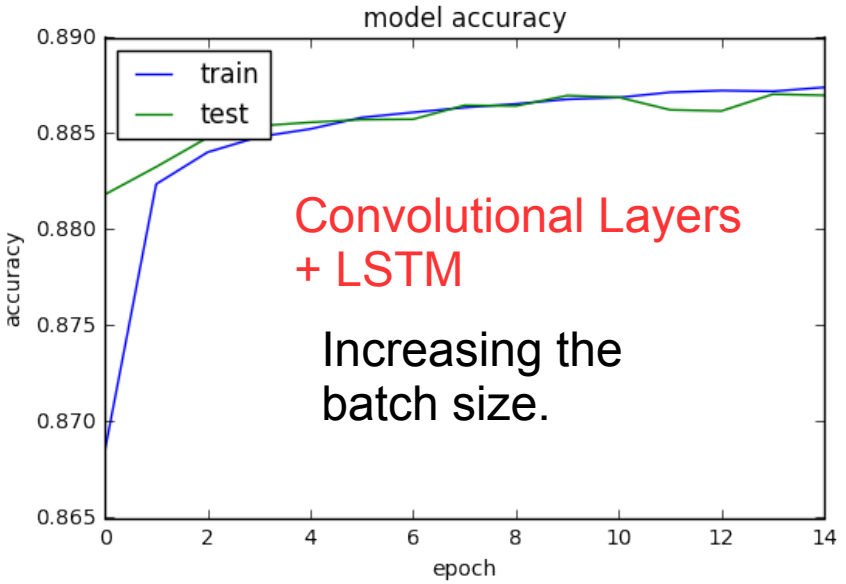


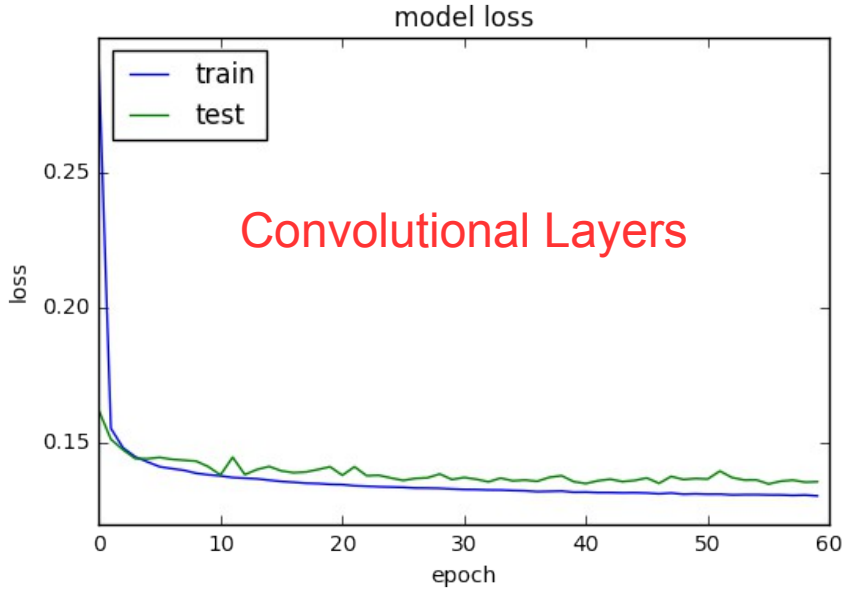


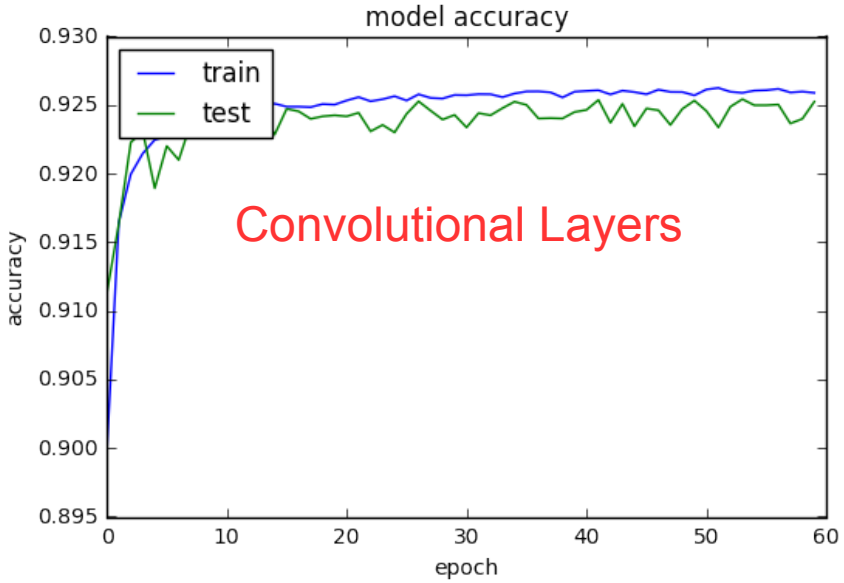


Training Performance





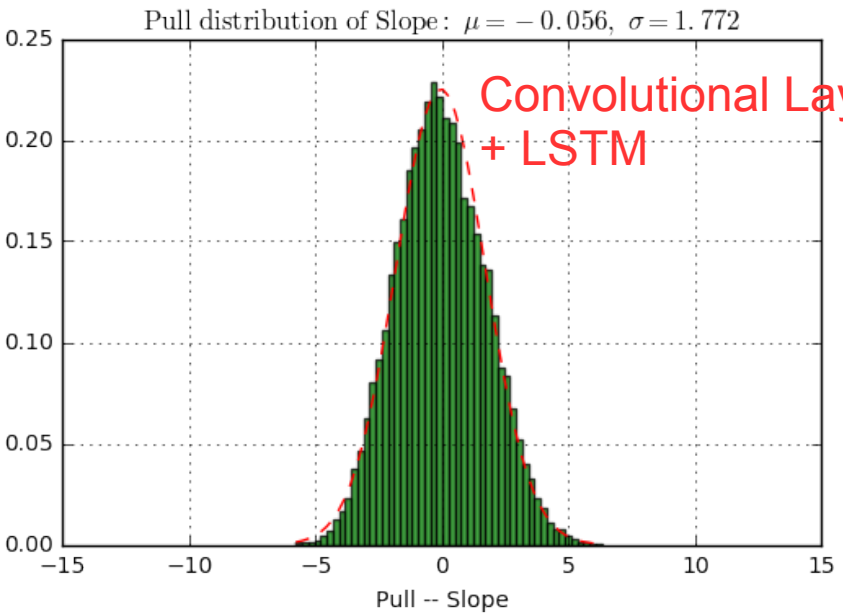


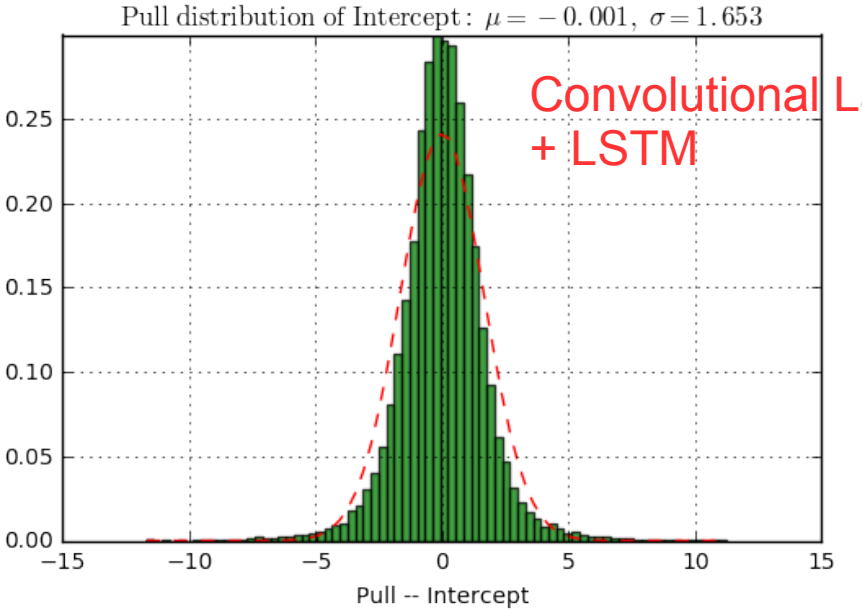


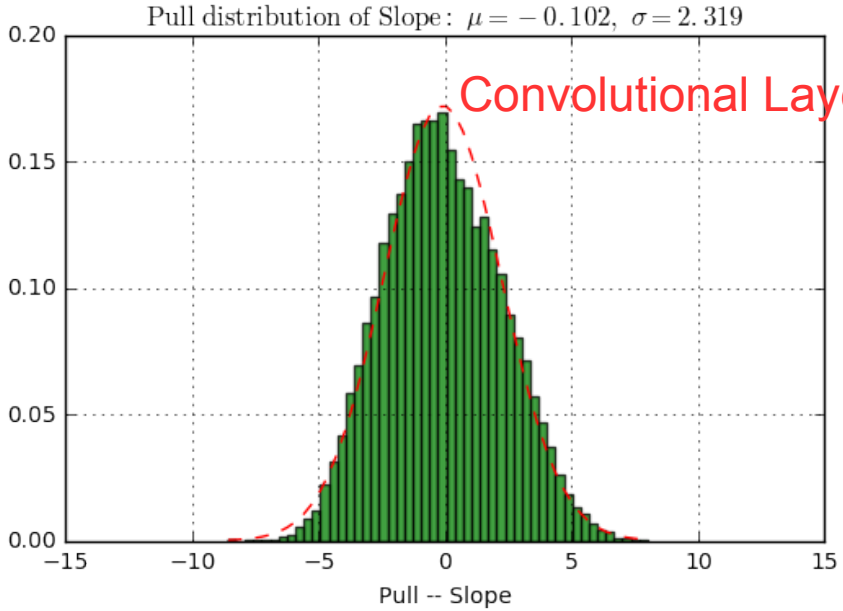
Training Performance

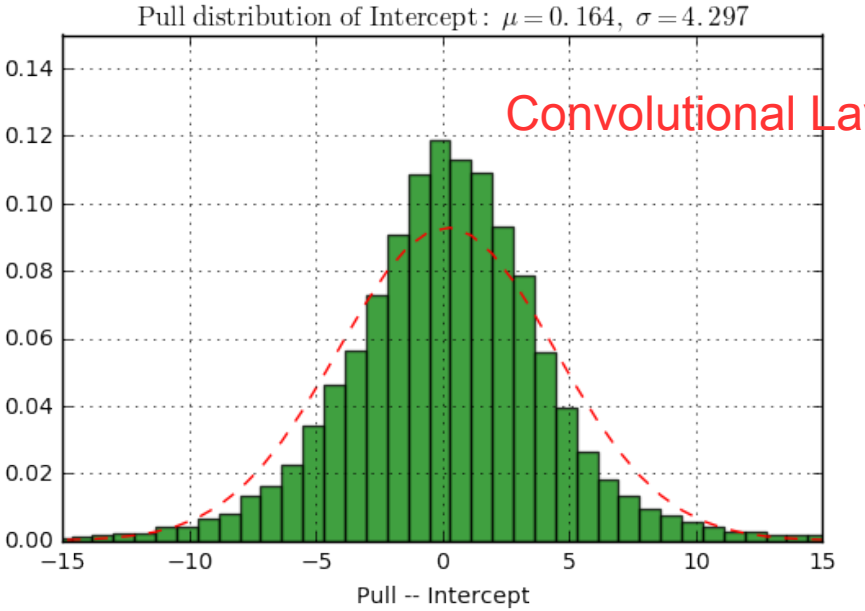
- Since two different networks, not a straightforward comparison based on those plots.
- Accuracy might not be meaningful for the two networks.

Pull Distributions









Future Work

- Find a proper way to assign errors to tracks (w/o fixing the number of tracks).
- After establish a proper metric:
  - Try different tolerance of the optimizer (or different optimizers).
  - Try minimize network model and hardware requirements.
  - More realistic detector conditions.