Closed-Loop Multi-Sensor SLAM for Fixed-Wing UAVs.

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Master Thesis
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Motivation

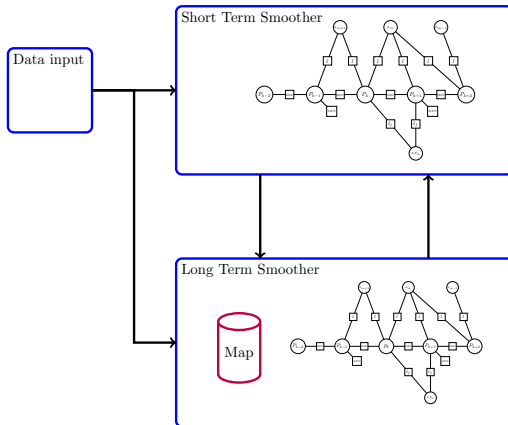Develop localization framework which can simultaneously:

- Estimate local navigation solution with minimal latency
- Find optimal solution given all the measurements

COOL MOTIVATING PICTURE GOES HERE!

Approach

Splitting the problem into short and long term problems

- Short
  local navigation solution

- Long
  solution given all data

<It would be a cool slide to explain the loosely-coupled approach that we aim at and could be moved to the beginning.>
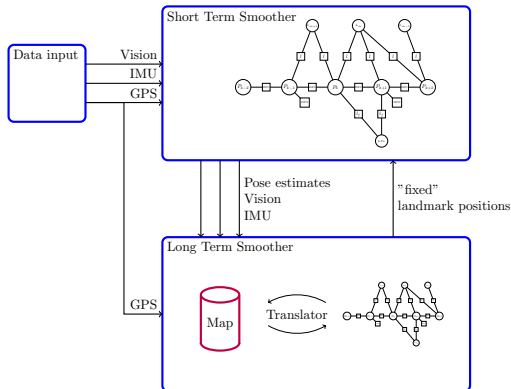
Work done so far

Short Term Smoother
- building a full factor graph given sensor data
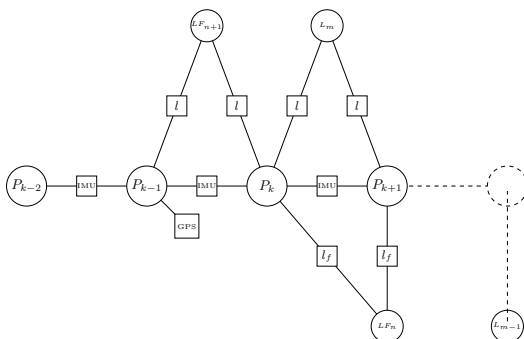- estimating position and passing data to LTS

Long Term Smoother
- building a map with the input data
- "translating" the map to a factor graph
- optimizing the factor graph and updating data in the map

Current challenges

- Reading landmarks from the map and translating them into a factor graph
- Inserting "fixed" landmarks into STS

Future work

- 3-stage landmark initialization
  - **–** Stage 1: compute 3D landmark coordinate and initialize the feature as binary factor (state x_k and x_{k+1}).
  - **–** Stage 2: formulate the feature re-projection factors connecting the 3D landmark state and pose.
  - **–** Stage 3: once uncertainty converges marginalize landmark state and switch back to binary factor formulation.
- Sliding-Window STS
  - **–** Reduce the STS problem to a sliding-window factor graph