Monocular SLAM

24-783: Advanced Engineering Computation

Short Presentation of Project Proposal

Team: Will Code for Food

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🎨 Project Overview

SLAM is the computational problem of constructing or updating a map of an unknown environment while simultaneously keeping track of an agent's location within it.

What will our program do?

- **Small-scale monocular SLAM system for static environment.**
- **Primary functionality:**
  Feature detection, feature tracking, camera pose estimation, and then mapping the landmarks using factor graph optimization (GTSAM)

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📌 Impact

Why did we choose this problem?

- **SLAM** is being increasingly deployed in a variety of real-world settings, from self-driving cars to mobile devices.

- **SLAM techniques** will be increasingly relied upon to provide reliable metric positioning in situations where infrastructure based solutions such as GPS are unavailable or do not provide sufficient accuracy.
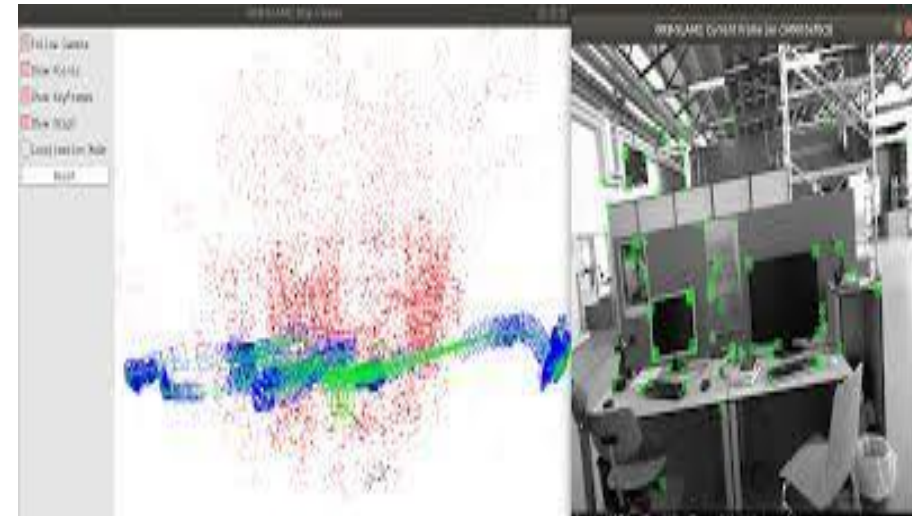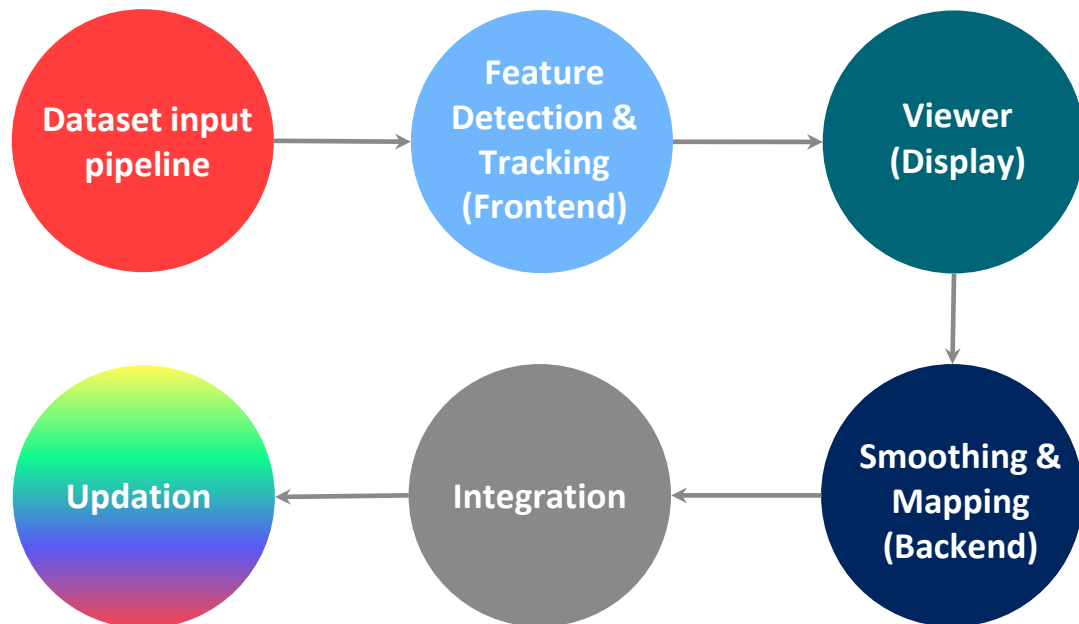
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📌 Reasonable difficulty for the course

- **Vast amount of topics from this Course are implemented for different stages**

- **Complex Build System :** Integrates low-level external libraries (GTSAM, Pangolin, Eigen, etc.)

- **Packages & Components work together :** Multithreading – Processes have different runtimes and need to be synchronized.

- **Data input contains multiple image frames :** Data Structures to improve execution speed.

- **Design pattern :** Optimal design; Classes employ effective constructors (move/copy) for efficient storage.

Our Process

Project Pipeline:

Dataset input pipeline → Feature Detection & Tracking (Frontend) → Viewer (Display) → Smoothing & Mapping (Backend) → Integration → Updation

Source: Link

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📍 Thank You!

- **Any Questions?**

Please find us at:

https://ramennoodle.me.cmu.edu/Bonobo.Git.Server/WillCodeForFood.git

- **Please don't forget to provide your feedback!** ☺

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