DYNAMIC SCENES - SLAM - ACCURATE PHOTOREALISTIC MAPS

[INTRODUCTION TO PROBLEM]

Dynamic scenes present challenges for SLAM systems due to the changes in the environment, which can affect accuracy and reliability. Photorealistic dense maps have many applications inside and outside robotics

[PROBLEM DEFINITION]
Thesis focus is on improving SLAM to handle dynamic environments effectively while generating photorealistic maps. Accurate differentiation of static and dynamic objects in the scene.

[REQUIREMENTS TO SOLVE THE PROBLEM]

1. Detection and segmentation of dynamic objects.
2. Tracking of dynamic objects.
3. High-quality, photorealistic map representation using 3DGS or Neural Fields

[PREVIOUS APPROACHES]

Mention literature
Past approaches often relied on optical flow for dynamic object detection or static map representations, leading to limitations in handling moving objects and providing accurate maps.

[SHIFT TOWARDS NEW APPROACHES]

Introduction of OpenSet segmentation methods like SAM. Feature and Optical Flow based prompting. Tracking using 3DGS.

[MORE IN DETAIL ABOUT THE NEW APPROACHES
- INTRODUCTION TO THE BASELINES]

Mention Literature

[DRAWBACKS OF THE EXISTING METHODS]

Ideas from the literature
Optical Flow is Slow, difficulty in reasonable prompting to SAM,...

[INTRODUCTION TO THE PROPOSED APPROACH]

Leveraging SAM2 for accurate dynamic object detection and segmentation, coupled with 3D Gaussian-based map representation for dense maps and accurate tracking in dynamic environments.

[FACTORS THAT WILL BE ADDRESSED BY THE NEW PROPOSED METHOD]

1. Improvement in addressing dynamic objects.
2. 3DGS map without clouds and improved tracking

[EXPERIMENTS DESIGNED TO EVALUATE THE CLAIMS - DATASETS, METRICS]

Experiments will involve evaluating the proposed method on standard SLAM datasets with dynamic scenes. Metrics will include dynamic object detection accuracy, map photorealism, and overall SLAM system performance.

[DISCUSSION ON THE EXPECTED FINAL RESULTS OF THE THESIS]