Progress Report

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1 To Do

- PVNet implementation: Test and document, learn and rewrite.
- Implement pose estimation: Keypoint uncertainty, understand RANSAC.
- Look into methods of generating uncertainty data.
- Pose Estimation Servery: On pause.
- Vision-based robotic grasping from object localization, object pose estimation to grasp estimation for parallel grippers - a review, [1]: Will read after PVNet implementation.
- Look into Facebook Flashlight C++ library, [2].
- Look into Nvidia Omniverse, [3].

2 Reading List

- [4]
- [5]
- [1]

3 Progress

The following items are listed in the order of priority:

- Nvidia Omniverse: If we consider a fully or semi robotic factory as a chaotic system, one can achieve controlability of agents through accurate modeling and synchronization. Through synchronization, chaotic systems can be reduced to dynamical systems which makes them controllable, [6].
- NBV Grasping Project: I am currently formating my drive to NTFS format for Windows installation. I had download SATA AHCI driver into a separate USB drive for the installation to begin. Then, I will have to install FreeCAD and design a mounting piece for L515.

- Robotics team Joe and Chris: I emailed out my availability for a weekly meeting but I haven't heard back.
- NASA MSI Fellowships: I read the solicitation. I will attend the next webinar on Wednesday.
- UTARI: I followed up with Quan and we decided to pursue Phased Array Radar project after the semester end. We need to sign up for ICRA 2021 and attend the workshop by Technical Committee for Autonomous Ground Vehicles and Intelligent Transfortation Systems, [7]. I could not figure out where to sign up for it. I would appreciate any guidance on that.
- Pose Estimation: I am working on PyTorch tutorials, [8].
- YCB Dataset [9]: Start with YCB data and look into Berk Calli's work.
- Normalized Objects [10]:
- Implement features from PoseCNN, DOPE, and BayesOD. - On pause.

4 Plans

The following items are listed in the order of priority:

- Pose Estimation in Simulation [11]: Use Nvidia Isaac SDK for in-simulation pose estimation training.
- Look into domain randomization and adaptation techniques.
- Project Alpe with Nolan: On pause for right now.
- UR5e: Finish ROS Industrial tutorials.

5 2021 Goals and Target Journals/Conferences

- Submit a paper on pose estimation with uncertainty to ICIRS.
- Get comfortable with TensorFlow and related Python modules.
- Keep writing.

References

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[8] "Welcome to pytorch tutorials — pytorch tutorials 1.8.1+cu102 documentation." `https://pytorch.org/tutorials/`. (Accessed on 04/16/2021).

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and size estimation," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2019.

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