Progress Report

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1 To Do

- PyTorch tutorials: On-going.
- PVNet implementation: Paused.
- Look into methods of generating uncertainty data.
- 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 PyBullet for RL.
- Look into Facebook Flashlight C++ library, [2].
- Look into Nvidia Omniverse, [3].

2 Reading List

- [4]
- [5]
- [6]
- [1]

3 Progress

The following items are listed in the order of priority:

- PyTorch Tutorials: I finished Tensorboard tutorial. Next, I will work on image segmentation and transfer learning tutorials.
- PVNet: Currently working on PyTorch tutorials. I will continue this in parallel until I finish it.
- NBV Grasping Project: I designed the mounting plate, Chris and I will prototype it early next week.

- NASA MSI Fellowship: I wrote two pages for initial draft. It is not well organized nor narrow in topic. I tried to set up the questions that need to be answered along with some notes as I was reading, [7]. Next, I will read some papers from
- UTARI: No new development.
- YCB Dataset [8]: Start with YCB data and look into Berk Calli's work.
- Normalized Objects [9]:
- 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 [10]: 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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[4] "roadmap-2020.pdf." `https://cra.org/ccc/wp-content/uploads/sites/2/2020/10/roadmap-2020.pdf`. (Accessed on 04/30/2021).

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[6] K. He, X. Zhang, S. Ren, and J. Sun, "Deep residual learning for image recognition. corr abs/1512.03385 (2015)," 2015.

[7] "Strategic technologies — science and technology." `https://scienceandtechnology.jpl.nasa.gov/research/strategic-technologies`. (Accessed on 04/30/2021).

[8] B. Calli, A. Singh, A. Walsman, S. Srinivasa, P. Abbeel, and A. M. Dollar, "The ycb object and model set: Towards common benchmarks for manipulation research," in *2015 international conference on advanced robotics (ICAR)*, pp. 510–517, IEEE, 2015.

[9] H. Wang, S. Sridhar, J. Huang, J. Valentin, S. Song, and L. J. Guibas, "Normalized object coordinate space for category-level 6d object pose and size estimation," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2019.

[10] Nvidia, "Nvidia isaac sdk — nvidia developer." `https://developer.nvidia.com/Isaac-sdk`, 2021. (Accessed on 02/05/2021).