Progress Report

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1 To Do

- Look into transfer learning. Read [1].

- Look into domain randomization and adaptation.

- Reconstruct a pose estimation model to familiarize myself and then start modifying it.

- Read [2].

2 Progress

Following items are listed in order of priority:

- Pose Estimation: I began dissecting [1], they used a Bayesian model to estimate distance traveled between each frame. They also introduced a "smart feature-encoding disentanglement technique" which I need to understand. They also used Lie Algebra (some vector-domain representation) for 3D orientation. I will finish this paper for next week. I also went over PoseCNN code but I need to finish setting up computer and upgrade lab computer to U20.04 and start playing with their NN model and apply all some ideas.

- OCRTOC: I successfully upgraded my computer, now moving to Ubuntu 20.04. I am trying to keep with Jerry at the same time trying to contribute on the research side.

- TensorFlow [3]: I continued to chapter 2, Dense layer turns out to be very basic implementation, a fully connected layer.

- MoreFusion [4]: Still need to write a literature review on this.

- Project Alpe with Nolan: We skipped this week's work session, we were both busy and Nolan had an important deadline.

- Reading list: [5] and [6].

- Quaternions:

- UR5e:

- Fellowship:

3　Plans

Following items are listed in order of priority:

- (On pause) Continue with ROS Industrial tutorials and documentation.

- (On pause) Resume Robotic Perception course as soon as possible.

- (On pause) Read Digital Image Processing by Gonzalez and Woods.

References

[1] J. Tobin, R. Fong, A. Ray, J. Schneider, W. Zaremba, and P. Abbeel, "Domain randomization for transferring deep neural networks from simulation to the real world," in *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 23–30, IEEE, 2017.

[2] C. Choi and H. I. Christensen, "Rgb-d object tracking: A particle filter approach on gpu," in *2013 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 1084–1091, IEEE, 2013.

[3] B. Planche and E. Andres, "Hands-on computer vision with tensorflow 2," 2019.

[4] K. Wada, E. Sucar, S. James, D. Lenton, and A. J. Davison, "Morefusion: Multi-object reasoning for 6d pose estimation from volumetric fusion," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pp. 14540–14549, 2020.

[5] J. Lampinen and A. Vehtari, "Bayesian approach for neural networksreview and case studies," *Neural networks*, vol. 14, no. 3, pp. 257–274, 2001.

[6] R. Li, Z. Liu, and J. Tan, "A survey on 3d hand pose estimation: Cameras, methods, and datasets," *Pattern Recognition*, vol. 93, pp. 251–272, 2019.