Yan Pan Individual Report

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In this project, my primary focus was on model training and data analysis. Due to the inconsistent sizes of our datasets and inaccuracies in the noise range for certain data, we encountered several challenges during model training, visualization, and data analysis. We explored various classification algorithms in an attempt to improve performance on these imbalanced datasets, which ended up consuming a significant amount of time.

While plotting, I faced particular difficulties with the Three Finger Gripper (F3) because its original coordinate system differed from that of the PR2 gripper. This discrepancy resulted in highly scattered and incorrect orientation vectors when plotting orientation vector scatter diagrams. To resolve this, I spent considerable effort manually implementing conversions from quaternions to Euler angles, and then to vectors using rotation matrices. Ultimately, I successfully produced accurate and meaningful diagrams.

To enhance the visual appeal and clarity of the plots, I invested substantial time in refining the appearance of the graphs. For instance, I carefully adjusted the axis colors, transparency, and arrow sizes for each 3D scatter diagram. Additionally, to make the visualizations more intuitive, I loaded URDF mesh points into the 3D images and connected these points with lines, successfully rendering the URDF in the 3D space.

During data analysis, I aimed to derive meaningful insights despite the quality issues within the datasets. For example, I analyzed why the model's performance excelled in terms of accuracy while other metrics, such as precision, recall, and F1-score, remained abnormally low or zero. This analysis highlighted the inherent bias caused by the imbalance in the datasets. Overall, I believe my efforts contributed to meaningful progress in both data visualization and understanding the challenges inherent in this project.