

M³A Policy: Mutable Material Manipulation Augmentation Policy through Photometric Re-rendering

Supplementary Material

Supplementary Experiment

As a supplementary analysis to the simulation experiments, we evaluated the performance of the DP-M³A method across different training epochs, as shown in the figure 5.

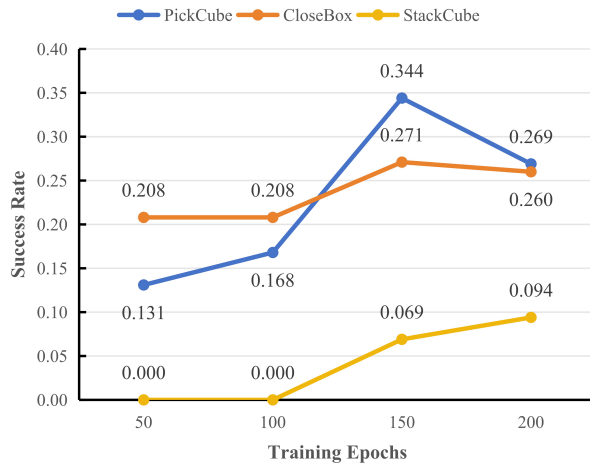


Figure 5. Success rate of simulation tasks under varying DP training epochs.

In the PickCube and CloseBox tasks, the performance improved with increasing training epochs up to 150 epochs. However, after 150 epochs, additional training resulted in a decrease in success rate. For the StackCube task, the success rate was 0 for fewer than 100 training epochs, but as the number of epochs increased, the success rate improved, reaching higher levels within 200 epochs. This difference across tasks may be due to the higher complexity of the StackCube task compared to the PickCube and CloseBox tasks, where fewer training epochs are insufficient for the robotic arm to learn the necessary features and strategies effectively.

Experiment Videos

For all the simulations and real-world experiments mentioned in the paper, we provide corresponding video files that demonstrate the successful execution of the tasks, showcasing the effectiveness of the M³A method across different scenarios.

Simulation Tasks. For the simulation tasks, we offer the following video files, each demonstrating the successful ex-

ecution of the tasks under three different kinds of materials:

- CloseBox_simulation.mp4: A silent video showing the CloseBox task.
- PickCube_simulation.mp4: A silent video displaying the PickCube task.
- StackCube_simulation.mp4: A silent video illustrating the StackCube task.

Real-World Experiments. Similarly, for the real-world experiments, we provide video files that show the successful execution of tasks on physical cubes made of multiple materials:

- picking.mp4: A silent video demonstrating the execution of the Picking task.
- picking_and_placing.mp4: A silent video showcasing the performance in the Picking & Placing task.
- long-horizon.mp4: A silent video illustrating the process of the Long-horizon Picking & Placing task.