

Rofunc: Useful Functions Package for Robot Experiments

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Abstract

This letter describes an approach to achieve well-known Chinese cooking art stir-fry on a bimanual robot system. Stir-fry requires a sequence of highly dynamic coordinated movements, which is usually difficult to learn for a chef, let alone transfer to robots. In this letter, we define a canonical stir-fry movement, and then propose a decoupled framework for learning this deformable object manipulation from human demonstration. First, dual arms of the robot are decoupled into different roles (a leader and follower) and learned with classical and neural network based methods separately, then the bimanual task is transformed into a coordination problem. To obtain general bimanual coordination, we secondly propose a Graph and Transformer based model — *Structured-Transformer*, to capture the spatio-temporal relationship between dual-arm movements. Finally, by adding visual feedback of contents deformation, our framework can adjust the movements automatically to achieve the desired stir-fry effect. We verify the framework by a simulator and deploy it on a real bimanual Panda robot system. The experimental results validate our framework can realize the bimanual robot stir-fry motion and have the potential to extend to other deformable objects with bimanual coordination.

Index Terms

Non-prehensile manipulation, bimanual manipulation, spatio-temporal relationship, stir-fry, robot cooking

I. INTRODUCTION

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