RO-MAN 2020 Workshop on Social HRI of Human-Care Service Robots

Adaptive Behavior Generation of Social Robots Based on User Behavior Recognition

Woo-Ri Ko, Minsu Jang, Jaeyeon Lee and Jaehong Kim ETRI, Korea



Introduction

For natural HRI, social robots should be able to understand a user's behavior and generate the most appropriate responses.



However, previous studies repeat predefined actions, so the robot is unable to respond to subtle differences in user behavior (e.g. position of hands). **RO-MAN 2020 Workshop on Social HRI of Human-Care Service Robots**



Proposed Method

✤ Overall system



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Proposed Method



https://ai4robot.github.io/air-act2act-en/#



Proposed Method

Robot Behavior Selection

Robot's Behavior

- u_0 stares for a command (r_0)
- u_1 bow (r_1)
- u_2
- u_3
- u_4 shake hand with right hand (r_2)
- u_5
- u_6 stares for a command (r_0)
- u_7 stretch hands to hug (r_3)
- u_8
- u_9 stretch hands to hug (r_3)
- u_{10} stares for a command (r_0)
- u_{11} stretch hands to hug (r_3)
- u_{12} block the face with arms (r_4)
- u_{13} block the face with arms (r_4)

< Behavior Selection Rules >



(a) r_0





< Key Poses of Robot Behaviors >



Proposed Method

- Robot Behavior Adaptation
 - For hugging behavior,
 the robot should stretch hands to the user's shoulder





Experiments

- Recognition Accuracy of User Behaviors : 98%
- Generated Behavior when the User Wipes Tears





Conclusion

- The proposed method using deep neural network has a 98% accuracy in recognizing the user's behavior.
- The selected behavior was modified (adapted) taking into account the user's posture, position, and physical characteristics such as height.
- The robot could naturally change the behavior in a situation where the user's intention is confused.