

# Online Incremental Classification Resonance Network and Its Application to Human-Robot Interaction

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**Abstract—** In human-robot interaction (HRI), classification is one of the most important problems, and it is essential particularly when the robot recognizes the surroundings and chooses a reaction based on a certain situation. Each interaction is different since new people appear or the environment changes, and the robot should be able to adapt to different situations during a brief interaction. Thus, it is imperative that the classification is performed incrementally in real time. In this sense, we propose an online incremental classification resonance network (OICRN) that enables incremental class learning in multi-class classification with high performance online. In OICRN, a scale-preserving projection process is introduced to use the raw input vectors online without a normalization process in advance. The integrated network of the convolutional neural network (CNN) for feature extraction and the OICRN for classification is applied to a robotic system that learns human identities through HRIs. To demonstrate the effectiveness of our network, experiments are carried out on benchmark data sets and on a humanoid robot, Mybot, developed in the Robot Intelligence Technology Laboratory, KAIST.

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