

# Air-Writing Recognition Using Convolutional Neural Network

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**Abstract:** Air based writing system refers to writing an alphabetical character or word in free space by moving a finger, marker, or handheld device. It is widely applicable where traditional pen-up and pen-down writing systems are troublesome. Due to the simple writing style, it has a great advantage over the gesture-based system. However, it is a challenging task because of the non-uniform characters and different writing styles. In this research, I developed an air-writing recognition system using three-dimensional (3D) trajectories collected by a depth camera that tracks the fingertip. For better feature selection, the nearest neighbour and root point translation was used to normalize the trajectory. We employed a convolutional neural network (CNN) as a recognizer. The model was tested and verified by the self-collected dataset. To evaluate the robustness of our model, we also employed the 2D convolutional neural network (2DCNN) alphanumeric character dataset and achieved best accuracy which is the highest to date. Hence, it verifies that the proposed model is invariant for digits and characters.

**Keywords:** non-uniform characters ; air-writing recognition; convolutional neural network

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