Multi-Layered Random Forest-based Metaphoric Hand Gesture Interface in VR

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Challenges in Hand Gesture-based VR Interaction

Self-occlusions in Egocentric Viewpoint
• Fingertips occluded by the back of the hand

Variances of a Gesture (speed, posture)
• Difficult to Generalize

Direct Manipulation (e.g. translation) is Difficult

Proposed Natural User Interface (Meta-Gesture)

Meta-Gesture supports
• Orientation-aware Selection & Manipulation

1. Identifying Partial Hand Shapes
• Summoning a functional object on the palm

2. Classifying Movement Patterns of Hand Parts
• Manipulating the Functional VR Object

User Summon a VR Tool & Activate the Function of the Tool

Proposed Hierarchical Static-Dynamic Gesture Learning Model†

Process of the Proposed Framework

M: Palm Pose Estimation*
X&E: Spatio-temporal Voxel Coding
F: Hierarchical Static & Dynamic (SD) Gesture Estimation

Static-Dynamic (SD) Voxel Feature

LSP stands for Layered Shape Pattern

Experiments with Datasets

Confusion Matrix of Ten-digit Clicking Action Classification: (left) thumb (Ours: 95.59%, 3D Finger CAPE: 89.80%) (right) Index finger (Ours: 96.55%, 3D Finger CAPE: 96.80%)

Evaluation via User Test

Interactive Scenarios of using Meta-Gesture

User Experience for VR Spraying
AR Camera Application
Immersive Gaming

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