Tangible Interaction for AR/VR

AR/VR devices need new forms of input.

- We need to increase the expressiveness of interaction beyond controllers and simple gestures.

Joint Hand-Object Tracking

ADVANTAGES

- Numerous 6DoF DOFs
- Dynamic feedback
- Skewed movements

CHALLENGES

- Extreme occlusions by objects
- Complex and fast motions
- Segmentation of hand from object
- High dimensional problem
- Run time constraint

Contributions

NOVEL FRAMEWORK FOR REAL-TIME HAND-OBJECT TRACKING

- Non-photorealistic
- Dynamics

MULTI-HYBRID SYSTEM FOR HAND-HAND OBJECT TRACKING

- Real-time 3D FPS
- Supports different shapes, sizes, occlusions

PRACTICAL

1. GMM Representation

2. Segmentation and Part Labelling

3. Multiple Proposal Pose Optimization

OBJECTIVE 1:

\[ E_{\text{final}}(A) = E_{\text{spatial}} + E_{\text{semantic}} + E_{\text{temporal}} + E_{\text{contact}} + E_{\text{occlusion}} \]

OBJECTIVE 2:

\[ E_{\text{final}}(A) = E_{\text{spatial}} + E_{\text{semantic}} + E_{\text{temporal}} \]

REAL-TIME TRACKING

NO. OF Frames (s)

0 5 10 15 20 25 30 35 40

AVERAGE FRAME ERROR (mm)

0 100 200 300 400

Tracking consistency for the best, worst and average case in Dexter+Object. We are consistently below 34 mm.

RESULTS ON DATASET AL (ICCV 2016)

RESULTS ON DATASET AND GALL (ICCV 2015)

LIVE CAPTURE SETUP

RESULTS ON DATASET AL (ICCV 2016)

RESULTS ON DATASET AND GALL (ICCV 2015)

Tablet with video goes here

Dexter+Object dataset available!
handtracker.mpi-inf.mpg.de

For access to a wide range of human shape and performance capture datasets, please visit:
guvperfcapoeva.mpi-inf.mpg.de

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