Real-time Joint Tracking of a Hand Manipulating an Object from RGB-D Input

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Tangible Interaction for AR/VR

AR/VR devices need new forms of input.

Joint Hand-Object Tracking

ADVANTAGES
- Extensive (6 DOFs)
- Haptic feedback

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

- Novel articulated 3D Gaussian mixture model for pose optimization
- Hand-object segmentation
- Energy terms motivated by physics of groups

PRACTICAL

- Single RGBD camera
- Real-time 30 FPS
- Supports objects of different shapes, sizes and colors

Multiple Proposal Pose Optimization

OBJECTIVE 1:

\[ E_{tailor}(A) = E_{spatial} + E_{anatomical} + E_{temporal} + E_{contact} + E_{occlusion} \]

OBJECTIVE 2:

\[ E_{tailor}(A) = E_{spatial} + E_{anatomical} + E_{semantic} \]

Results

RESULTS ON DATA FROM TZIONAS ET AL. (ICCV 2016)

RESULTS ON DATA FROM Tzionas AND Gall (ICCV 2015)

REALTIME TRACKING

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:
gvperfcapeva.mpi-inf.mpg.de

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