**MR-based Training System of Movie Action Scenes**

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**Video (MR-PreViz Project)**

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**General workflow of filmmaking**

- **Preproduction**: Planning, scripting, casting, writing storyboards, location hunting, and constructing props.
- **Production**: Rehearsals, actual shooting, and special effects.
- **Postproduction**: Film editing, sound mixing, and visual effects (VFX).

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**Workflow of filmmaking using MR-PreViz**

1. **Preproduction stage**
   - **Pre-meeting**: Deciding scenes using MR-PreViz.
   - **Local adjustment between VR spaces and real scenes**.

2. **Phase 1 Pre-meeting**
   - **Data arrangement**: 3D-space layout tool.
   - **Local adjustment between VR spaces and real scenes**.

3. **Phase 2 Data arrangement**
   - **Sewing action scenes and CG props**.
   - **Verification of action scenes**.
   - **Verifying recorded camera-work**.

4. **Phase 3 Shooting of MR-PreViz**
   - **Recording camera-work data**.
   - **Examining camera-work**.

5. **Phase 4 Actual shooting**
   - **Verifying recorded camera-work**.

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**Action data in MR-PreViz**

- **Recording action data**
- **Constructing action scenes**
- **MR-PreViz movie**
- **MoCap data**
- **3D Video data**

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**Construction methods of action scenes**

(a) Recording the assumed whole action scene at once.
(b) Merging one actor’s action sequences recorded individually.
(c) Splicing building blocks of action data to construct action sequence.

**Time and space consistency**

**Smooth splicing action blocks**
Building blocks of swordfight action

• 115 building blocks (43 offence actions and 38 defense actions) of swordfight action were recorded.
• Every data starts and ends in some pre-established poses.
• They were recorded in consultation with a professional swordfight arranger.

Smooth splicing building blocks

Adjusting time and space consistency

For merging individually recorded action data, adjusting time and space consistency is important.

Correct timing and position
Incorrect timing and position

Adjusting action speed so as to accord KF (Key Frame) between two characters

Character A
Character B (before adjusting)
Character B (after adjusting)

KF is a frame in which two characters’ actions are intersected.
TCFs (Timing Controllable Frames) are frames that don’t give uncomfortable feeling when the playback speed is changed.

Adjusting space consistency (1)

• Specifying CP (contact point) at every key frame
• Parallel translating characters so as to accord CPs between two characters

Before adjustment
After adjustment

CP is a 3D point in which two character’s actions are intersected.

Adjusting space consistency (2)

• Specifying PCFs (Position Controllable Frames)
• Parallel translating characters in PCFs so as to accord CPs between two characters

Character A
Character B

PCFs are frames that don’t give uncomfortable feeling when the character moves parallel in a horizontal plane.
Without time and space adjustment

With time and space adjustment

MR Action rehearsal system

- The user can run through the swordfight action scenes from the actor’s view through an HMD.
- The user can see CG enemies and the sword blade.
- The system evaluates the user’s swordfight action.

System configuration

Video (MR Action rehearsal system)

Summary and future work

Summary
- Action data in MR-PreViz project
- Some methods for constructing action scenes
- MR Action rehearsal System

Future work
- Constructing complicated action scenes involving multiple characters
- Improvement of evaluating user’s action
Thank you!!

- Discussions & More information
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