Automatic Data Acquisition Based on Abrupt Motion Feature and Spatial Importance for 3D Volleyball Analysis

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➢ Research Background

Volleyball Game videos

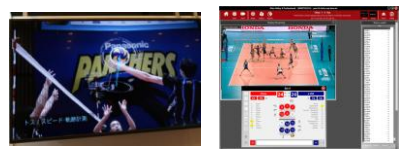
Automatic sports analysis

Automatic data acquisition
- **Physical data**
- **Event data**
- **Strategy data**

Applications

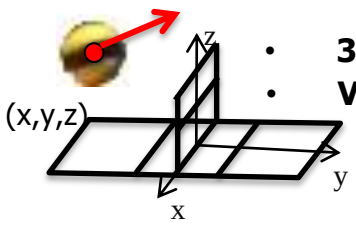
TV content

Strategy analysis



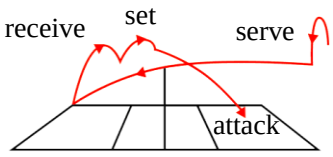
➢ Proposal and Experimental Results

Physical data



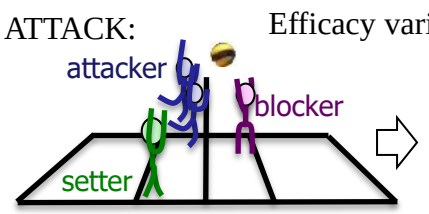
- **3D position**
- **Velocity**

Event data



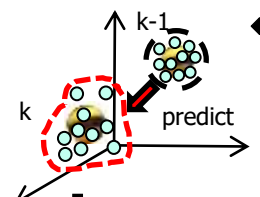
- **Ball event**

Strategy data

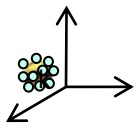


Next state ○Particle

Abrupt Motion Adaptive System Model (P1.1)

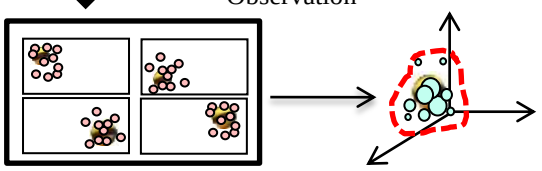


Estimation



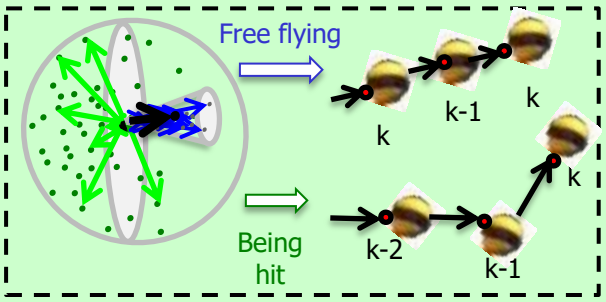
Recovery by ball candidate distribution (P1.3)

Observation

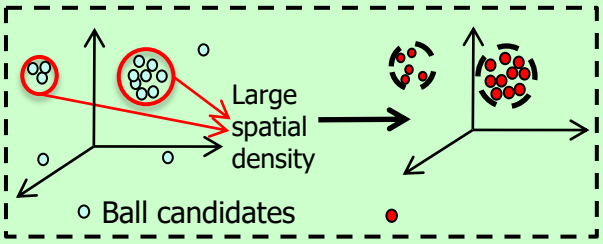


Anti-occlusion observation model (P1.2)

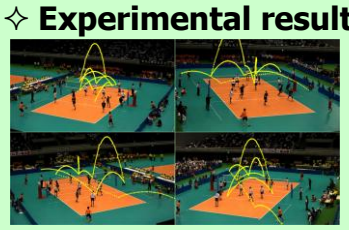
Proposal 1.1:



Proposal 1.3



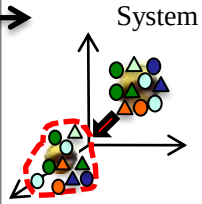
✧ **Experimental results**



Success rate
99.4%

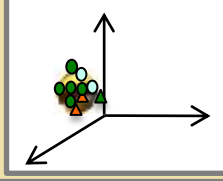
Next state

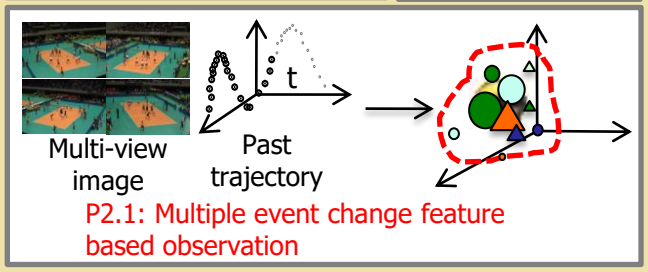
System model



P2.2: Spatial event change distribution

Estimation

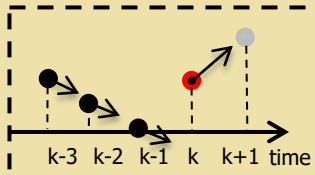




P2.1: Multiple event change feature based observation

▲ Event change ● Event keep Different color: ball event type

Proposal 2.1:



Trajectory abruptness based likelihood

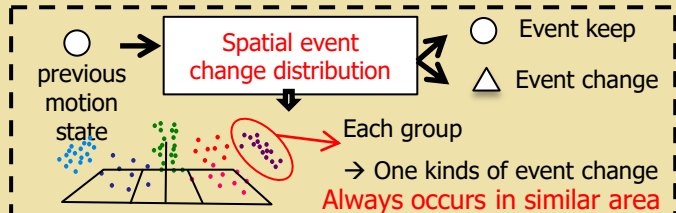
Skin color observed area

Ball feature observed area

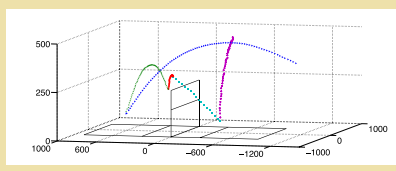
Area of players' skin based likelihood

Event change observation

Proposal 2.2:



✧ **Experimental results**

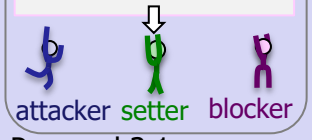


Detection rate
92.4%

Player role detection

P3.1: Relative motion abruptness

P3.2: Relative court zone division



Efficacy variables calculation

Set zone (SZ)

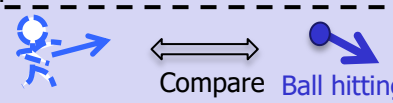
Blocker number (BN)

→ Attack type

Attack tempo (AT)

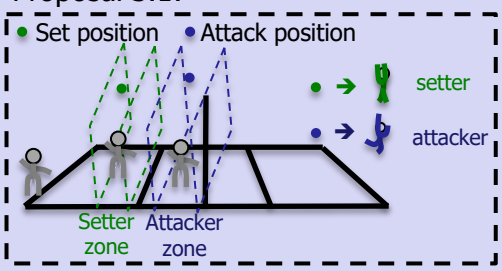
Available attackers number (AN)

Proposal 3.1:



Ball relative distance & velocity

Proposal 3.1:



✧ **Experimental results**

Efficacy variables	precision
SZ	84.4%
AN	91.1%
AT	88.6%
BN	100%

➢ Conclusion

Automatic data acquisition

Spatial Importance

Abrupt Motion Feature

- Various kinds
- High precision (92%~100%)
- Data hard observed by human
- Automatic acquisition

Impact

Automatic Data Volley System

New Data for TV Contents

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Waseda University