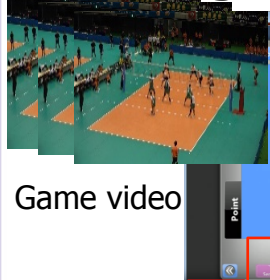


Team Formation Mapping with Sequential Motion and Relative Spatial Features Based Event Evaluation for Automatic Data Volley

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Background



Game video



Two main factors

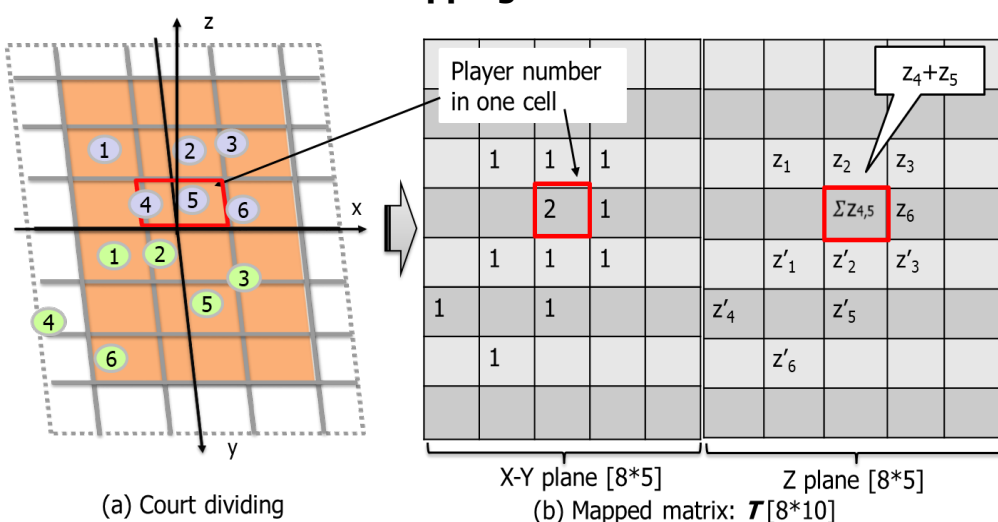
Category	Content
Event type	Serve, Receive, Attack, Block, Dig, Set, Free Ball.
Quality	# + ! / - = (good → bad)

- Strategy analysis:**
- Performance evaluation.
 - Coaching assistance.

Proposals

Event type detection

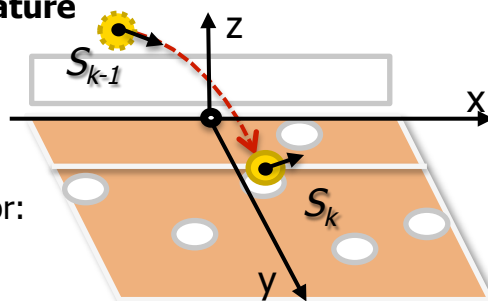
➢ P1: Team Formation Mapping



➢ P2: Sequential Ball Motion Feature

For the k_{th} hit:

- Ball motion state vector:
 $S_k = [(x_k, y_k, z_k), (vx_k, vy_k, vz_k)]$.
- Sequential ball motion state vector:
 $(S_{seq})_k = [S_{k-1}, S_k]$.



Experiment result

Event type detection			Quality acquisition	
	Precision	Recall	Accuracy	Success rate
Serve	100%	100%	100%	100%
Receive	100%	100%	100%	96.77%
Set	96.97%	96.97%	97.33%	97.22%
Attack	100%	98.36%	98.28%	95.72%
Block	100%	100%	100%	97.87%
Dig	97.62%	100%	96.70%	96.05%

Problem

Event type detection

- High similarity for intra-class variation.
- Small difference between time-adjacent events.

Quality evaluation

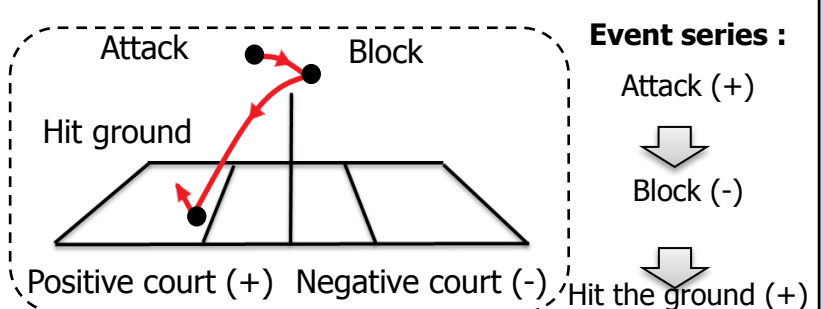
- Relying on the condition of following events with different bases.

Proposal

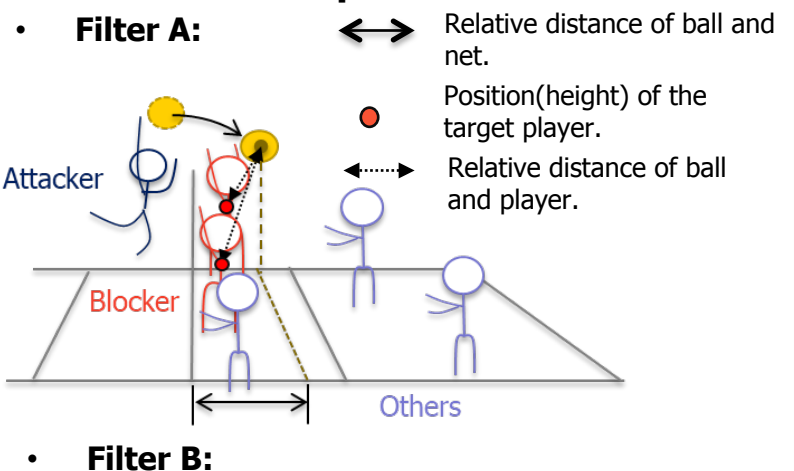
- Utilization of player information:
P1: Team formation mapping.
- Referring to the temporal relationships of events:
P2: Sequential ball motion feature.
- Referring to the following events:
P3: Event series feature.
- Using relative distribution to represent different situations:
P4: Relative spatial filter.

Quality evaluation

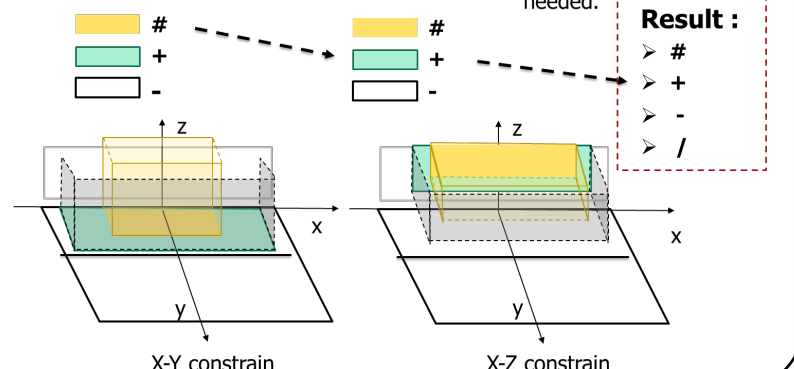
➢ P3: Event series feature



➢ P4: Relative Spatial Filter



- Filter B:
- (1) First judgment. ➡ (2) Second judgment. ➡ (3) Reduce the level if needed.



Conclusion

- Average accuracy of 98.72% for event type detection.
- Average success rate of 97.27% for obtaining quality.

