Team sports analytics using AI

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Biography (Keisuke Fujii / 藤井 慶輔)
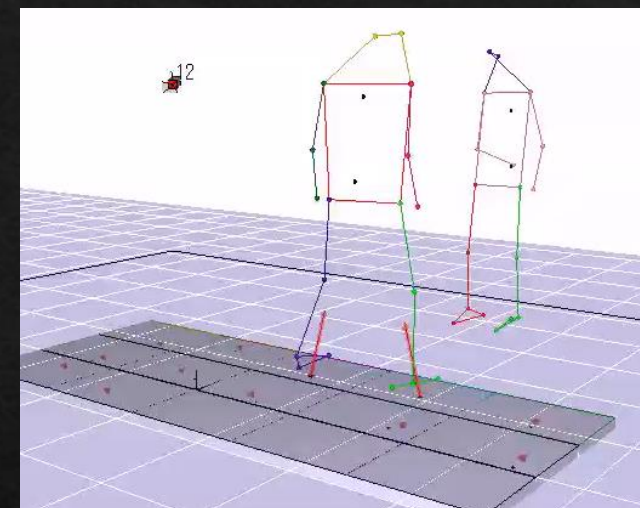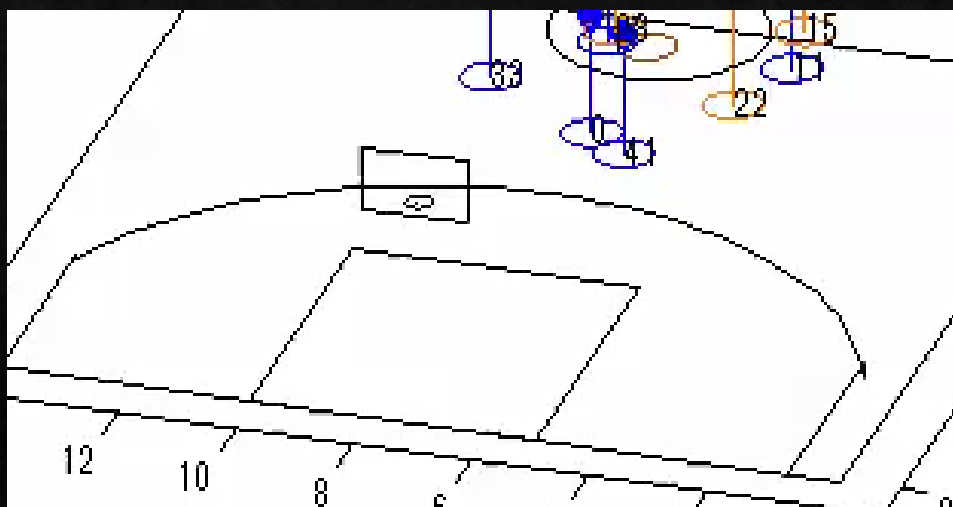
2014 received PhD in Kyoto Univ., Japan

2014-17 Post-doc. in Nagoya Univ., Japan

2017-19 Research Scientist in RIKEN Center for Advanced Intelligence Project, Japan
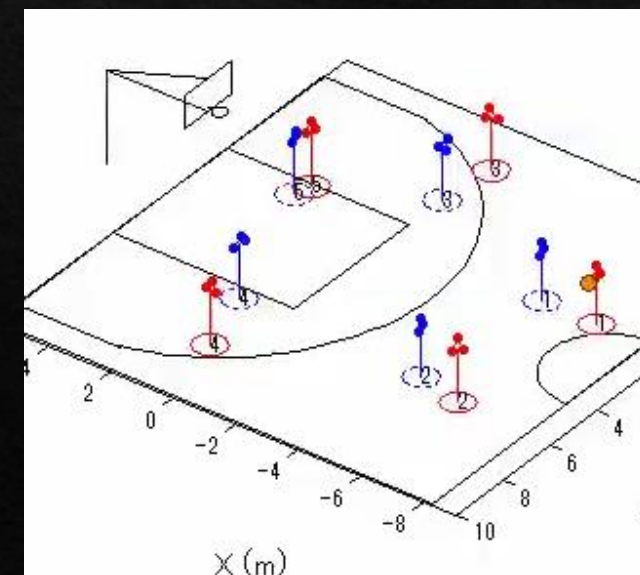
2019-21. Assistant Professor in Nagoya Univ., Japan

2021- Associate Professor in Nagoya Univ., Japan

Motion analysis (2012)

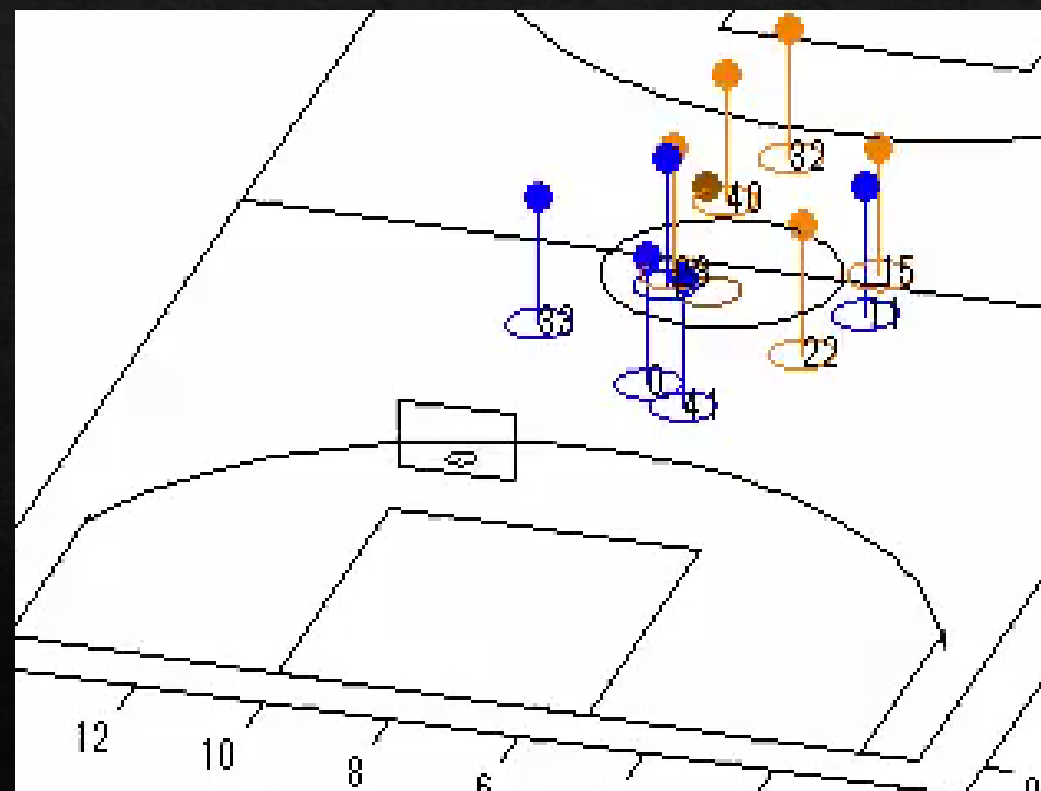NBA game data (SportVU, 2015)

Team sport analysis (2015)

Recent development in measurement

Motion data of actual sports games has recently measured

SportVU
(NBA)

https://www.stats.com/sportvu-basketball/

How is sports analytics advancing?

Problem in sport analytics

Practically, video-based analysis was mainly used
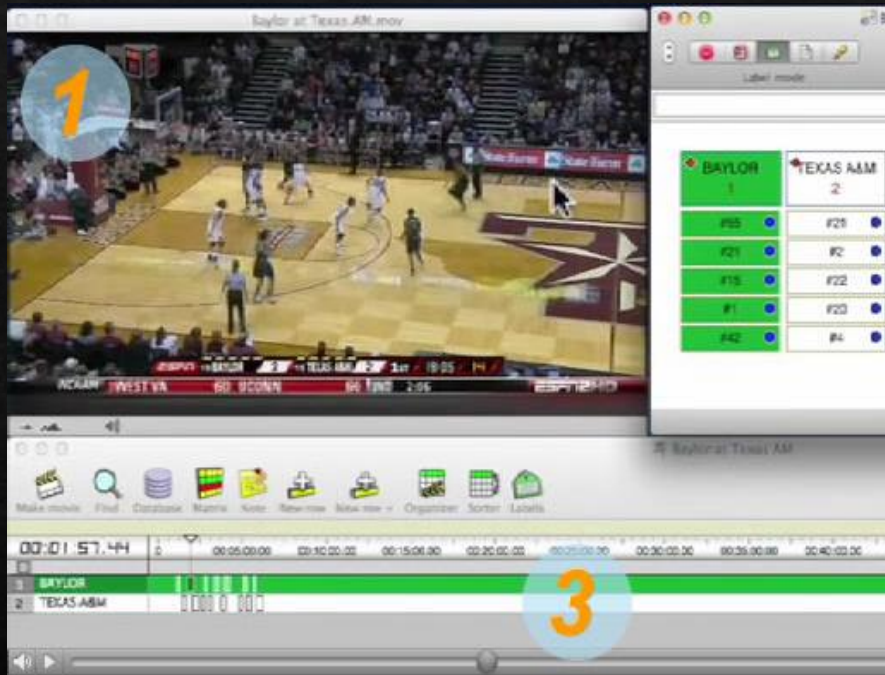
(Sportscode）

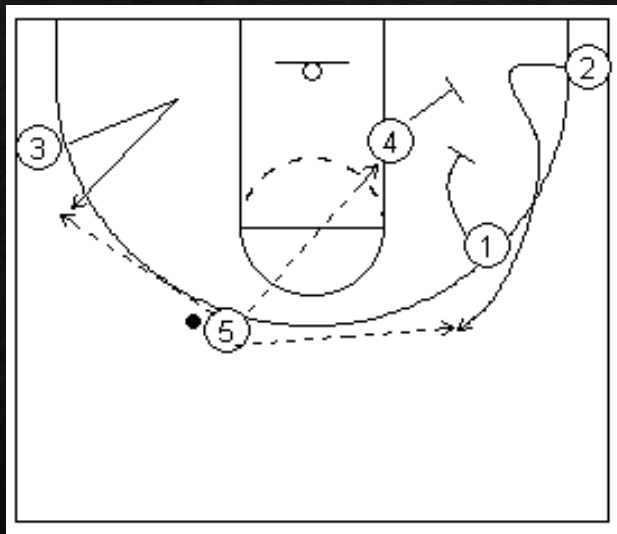| Play Types	% Time	Poss
Off Screen	38.7%	404
Hand Off	18.5%	193
Spot Up	16.6%	173
Transition	12.2%	127
P&R Ball Handler	5.5%	57
Isolation	2.5%	26
Cut	1.4%	15
P&R Roll Man	0.5%	5

(Synergy)

But technology using positional data is not developed

Fundamental problems and our approach

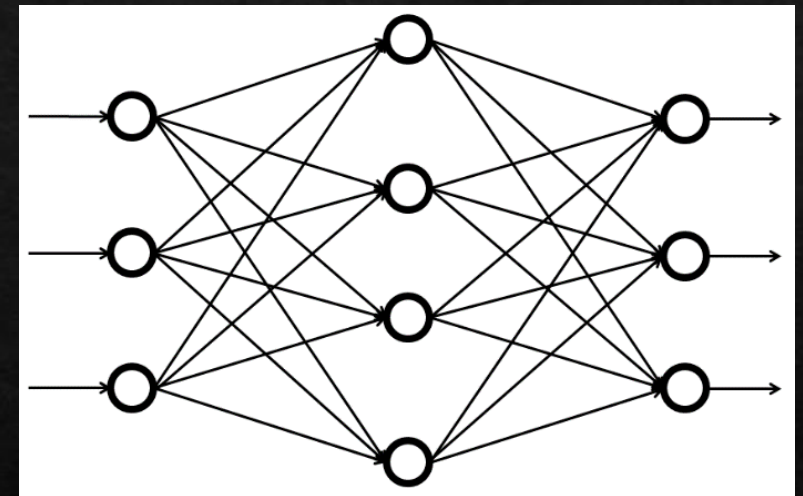**Problem:** gap between sports knowledge and AI

Sports knowledge

AI/machine learning

Hard to model
Should decompose

Hard to interpret
Not intuitive

Our approach: Evaluation based on prediction via integration of sports knowledge and AI

Our achievements on sports science and machine learning:

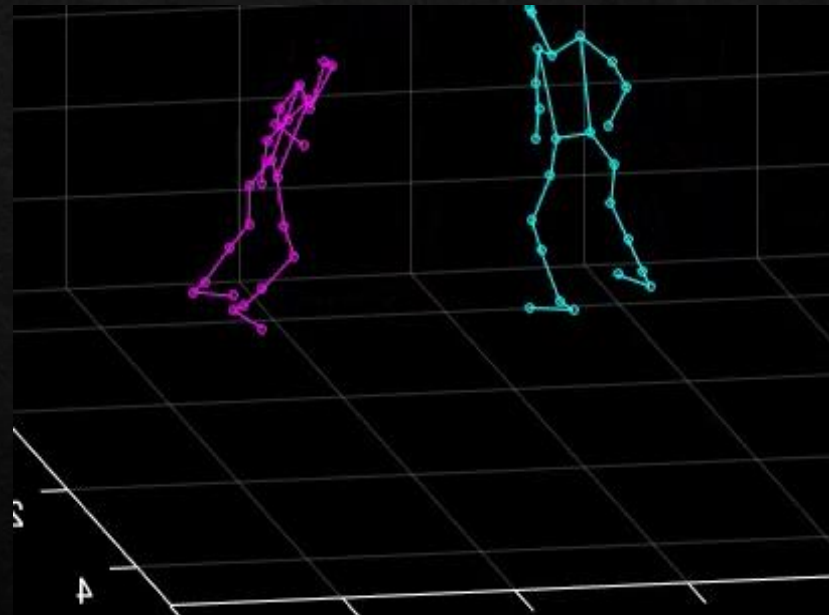https://sites.google.com/view/keisuke1986en/home/publication

Example of our sports analytics using AI

1. Classification of (multi-agent) motion patterns
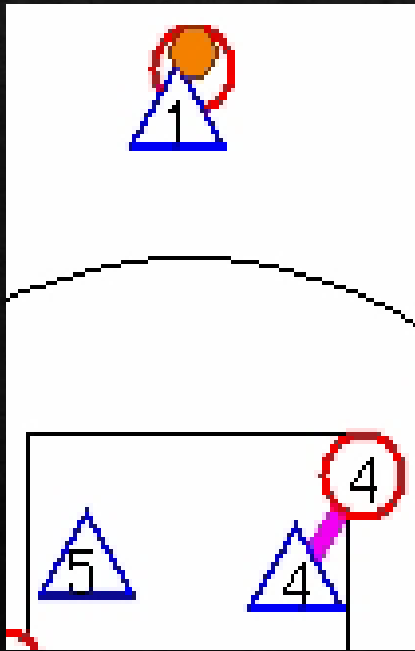2. Prediction and control of movements
3. Evaluation of skillful movements

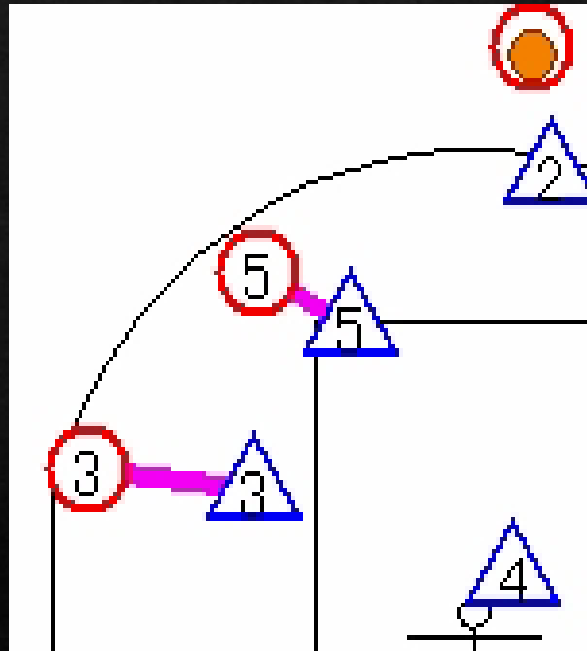

NHK Miracle Body (Neymar, left)
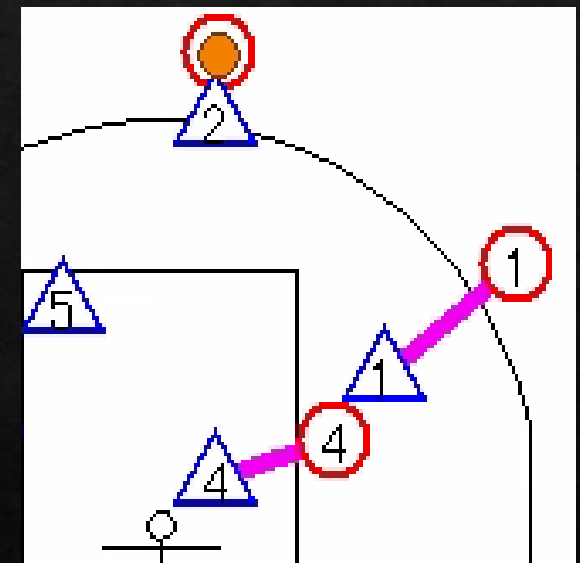
1. Classification of (multi-agent) motion patterns

Transient help and back
（▲4）

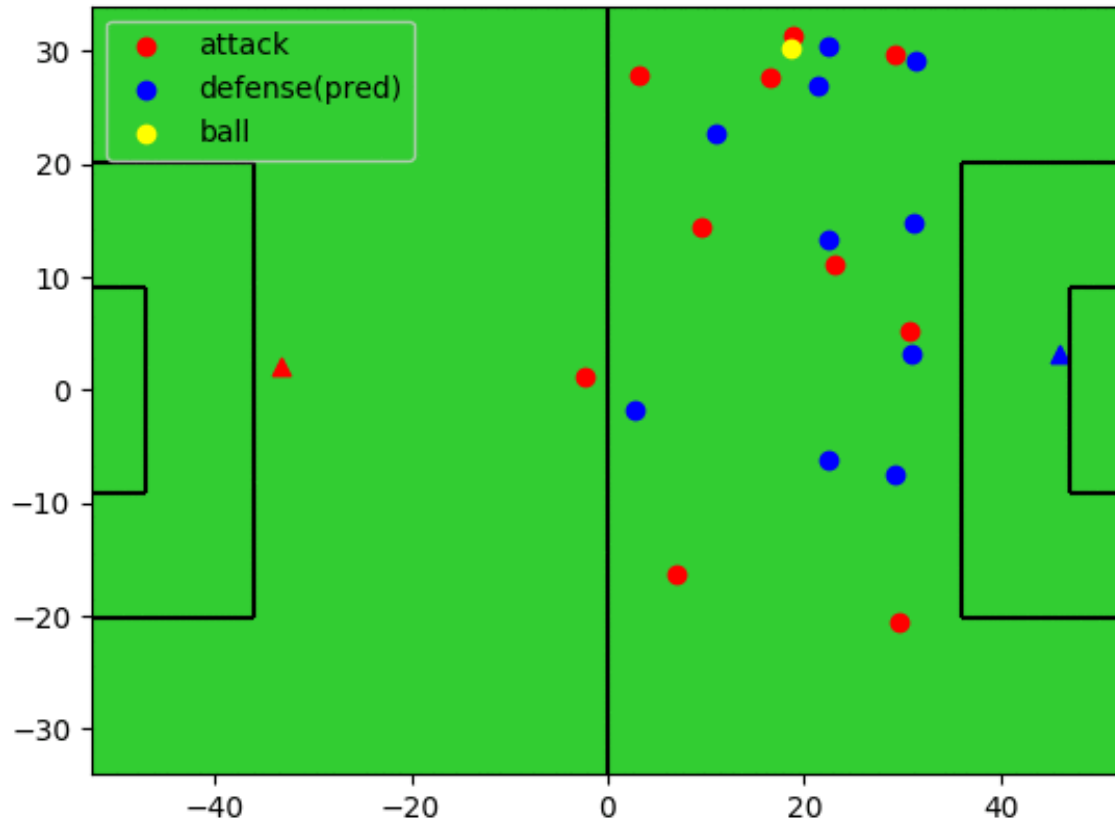Switch the roles
（▲3 and ▲5 ）

Global help
（▲4）

(Fujii et al. 2016;
Hojo et al. 018)

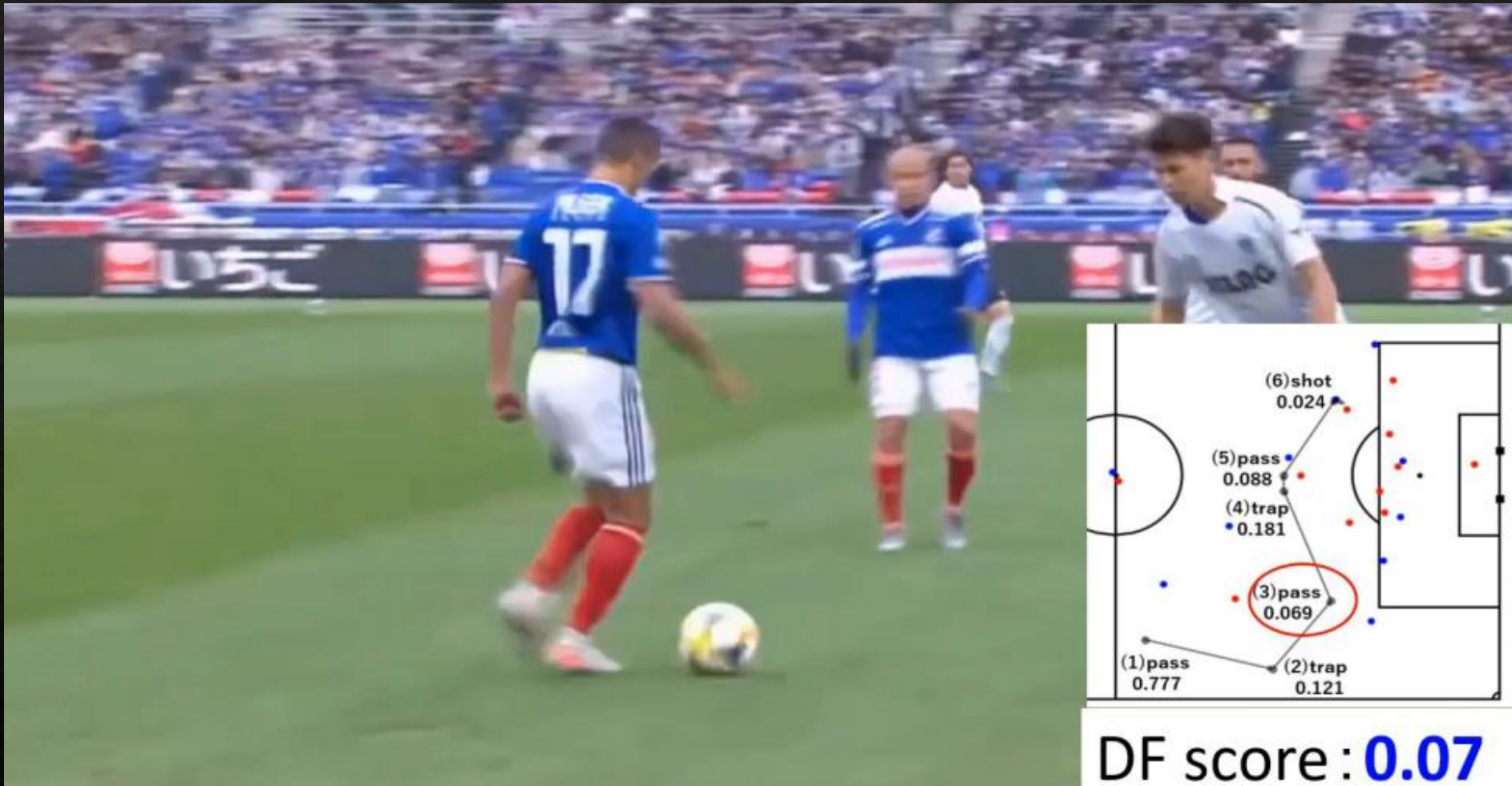Classification: for evaluating labeled teamwork

2. Prediction and control of movements

(Teranishi et al. 2020
Fujii et al. 2020)

Agent modeling: predicting and controlling
the motions for winning games

3. Evaluate skillful movements

2019 J1 League 34th Sec Yokohama F.Marinos vs F.C.Tokyo   (Toda et al. 2022)

Valuing actions and motions: for evaluating skillful motions flexibly responding to situations

3. Evaluate skillful movements

(Ding et al. under review)

Valuing actions and motions: for evaluating skillful motions using pose information and reinforcement learning
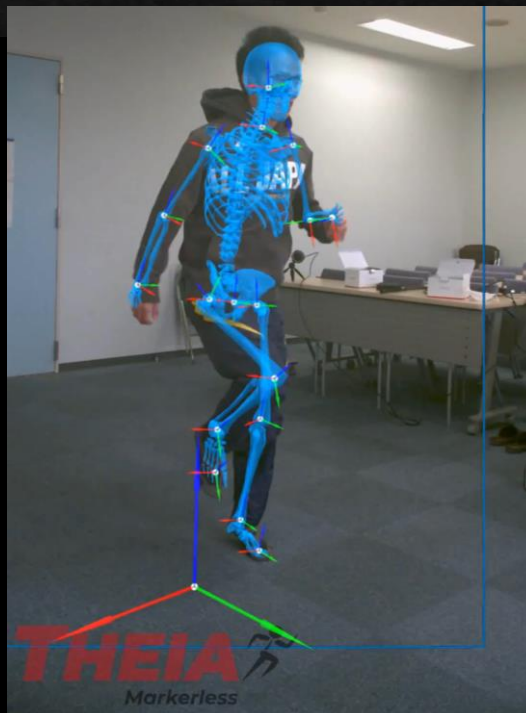
Other topics

professionalbaseballpa

Various sports

- soccer, basketball, rugby, baseball

- badminton, race walk

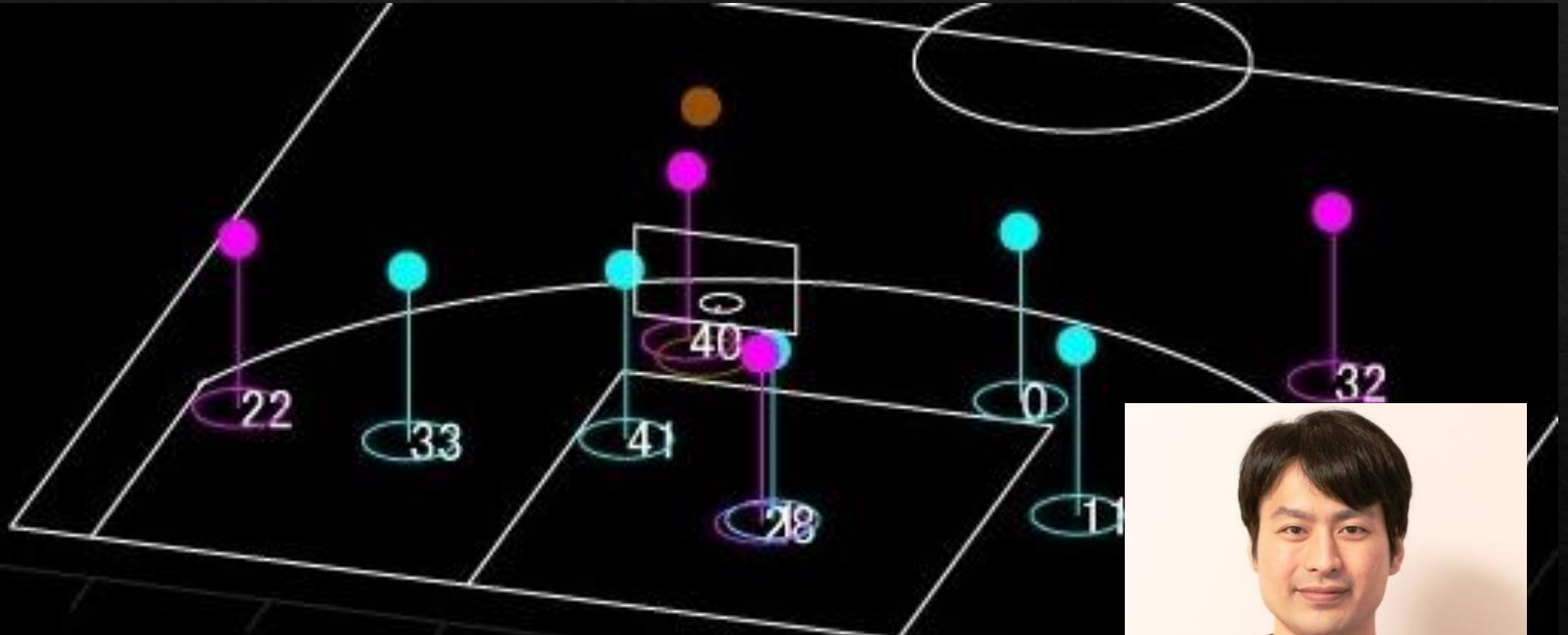- simulation, reinforcement learning

Other than sports (tag plays, vehicles, animals, etc.)

(Markerless mocap)

(Google Research Football)

Thanks for listening, questions?

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