



TennisProfile: Reliability-Aware Groundstroke Profiling from Monocular 3D Human Recovery

Jinkun Peng · Independent Researcher, Shenzhen, China

ECCV 2026

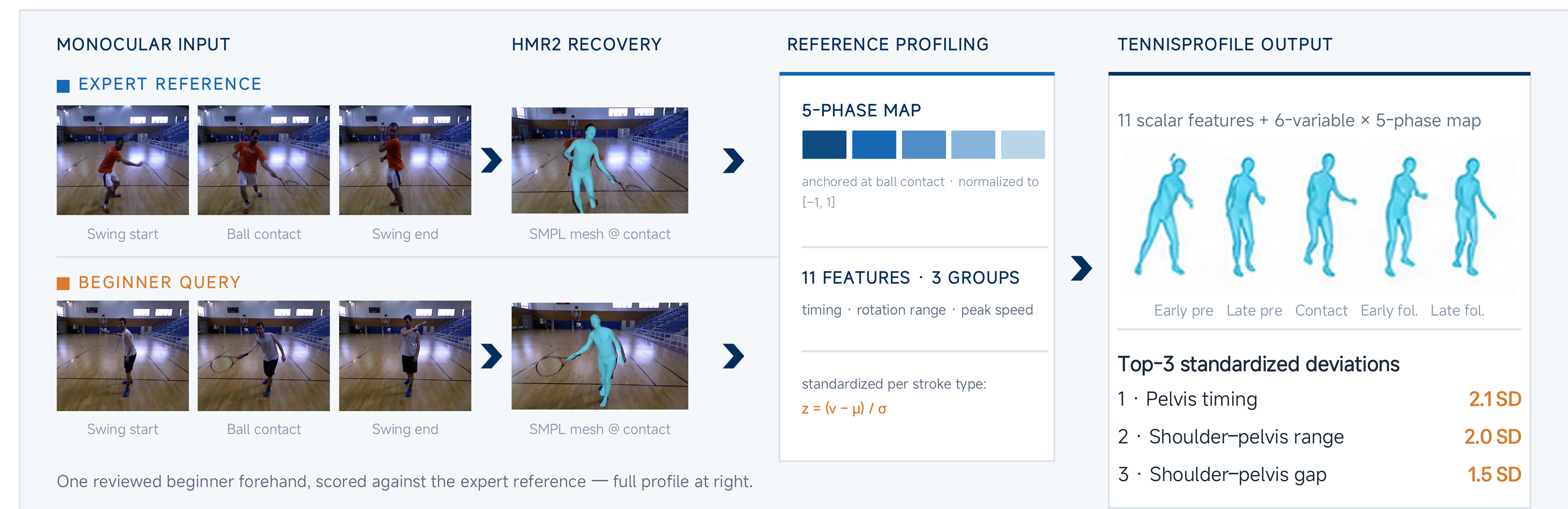
MALMÖ · SEPT 8-12

WHY

Stroke labels tell **what** happened — not how motion **differs** from expert technique.

Monocular 3D recovery provides dense motion, but useful review requires named variables, phase localization, and explicit evidence levels.

FROM RGB STROKE TO TENNISPROFILE



WHAT WE FOUND

0.49 vs **0.76** SD

Mean absolute deviation from the expert reference — held-out experts vs beginners (↓)

0.0% vs **9.7%**

Feature values outside the expert min-max range — held-out experts vs beginners (↓ better)

15.4% vs **43.2%**

Matched SportsPose-HMR2 relative difference — rotation-range vs peak-speed features (↓ = stronger cross-source support)

PIPELINE

STEP 01

Monocular RGB

Forehand / backhand stroke clip

STEP 02

Reviewed events

Swing start · Ball contact · Swing end

STEP 03

HMR2 recovery

SMPL mesh and joint motion

STEP 04

Motion representation

11 scalar features · 6 variables × 5 phases

STEP 05

Expert reference

Stroke-specific standardized deviation

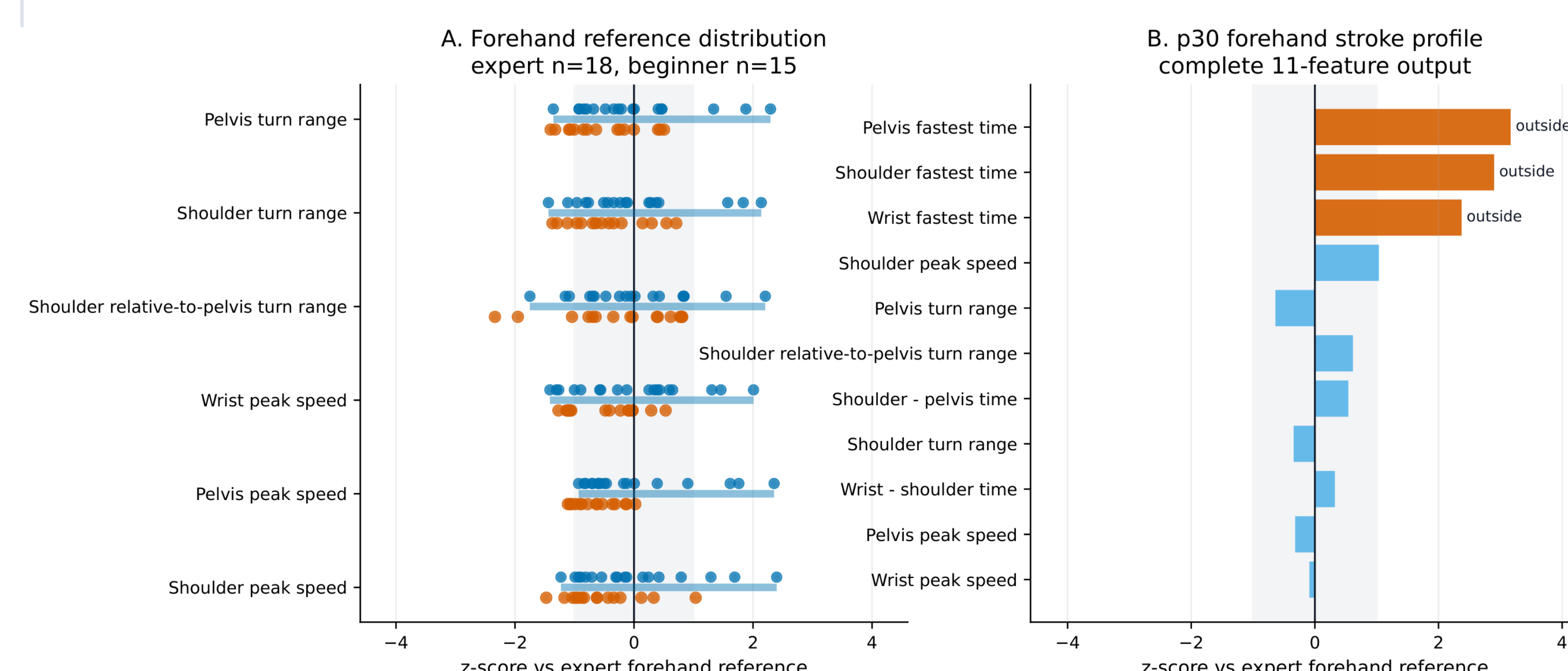
STEP 06

TennisProfile output

Top-3 deviations · phase localization · evidence level

REFERENCE DISTRIBUTION & INDIVIDUAL PROFILE

flat forehand · z-scores vs expert reference (n = 18 experts, 15 beginners)



Blue = inside the expert min-max range, orange = outside. Dots: group-level distribution on six features; bars: a beginner's complete 11-feature profile.

14 of 15 beginners show lower pelvis peak angular speed (BH q = 0.005); rotation ranges rarely leave the expert range — the contrast lives in **contact-window speed**.

JOINT-TIME DEVIATION MAP

beginner mean z-score vs expert phase reference



RELIABILITY HIERARCHY

Rotation range

strongest cross-source support

Fastest-motion timing

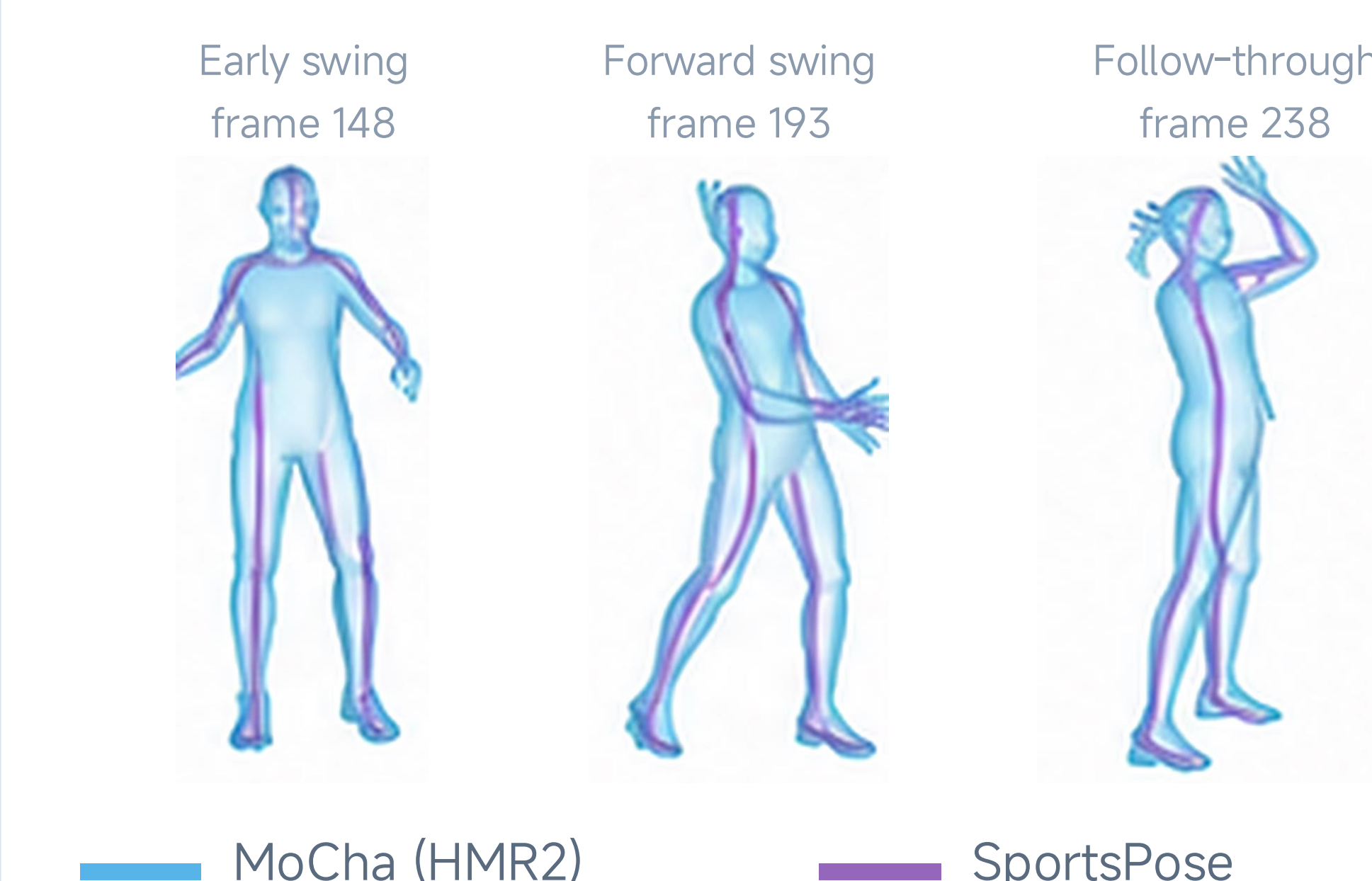
same-source cue · 66.7 ms

Peak speed

same-source reviewed cue

CROSS-SOURCE OVERLAY

SportsPose · matched 90 fps RGB trials · 4 subjects



CODE & DATA

github.com/pengjk0-dotcom/TennisProfile

CONTACT

Jinkun Peng · pengjk0@gmail.com

TAKEAWAY

what differs · where it occurs · how strongly each cue is supported