# What Can Hawk-Eye Data Reveal about Serve Performance in Tennis?

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### What is the Hawk-Eye system for tennis?



- up to 10 cameras around the tennis court
- vision processing, triangulation

➡ 40 Hz 3D-trajectory of the ball

#### XML data

```
<?xml_version="1.0"_encoding="UTF-8"_standalone="no"..?>
<point_valid="true">
//// <hawkeye header>
uuuu<xmldateud="Data"/>
UUUUI<serverup="CLIJSTERS"/>
□□□□<receiver□p="HENINHARDENNE"/>
UUUU</positive_p="HENINHARDENNE"/>
uuuu<serve_classuc="1"/>
uuuull<scorerus="-1"/>
PointDuration w="6.26786"/>
uuuu<score_rawus="1,0"/>
/hawkeye_header>
serve(name="CLIJSTERS")player="1",speed="46.46",speedEnd="31.87">
coord_t="0"_x="1.47"_y="-11.89"_z="2.70"/>
coord_bounce="true"_t="0.49025"_x="-3.05"_y="6.17"_z="0.033"/>
/serve>
shot_speed="31.3742"_speedEnd="19.8407">
coord_t="0.8",x="-4.15587",y="11.766",z="1.06128"/>
coord, bounce="true", t="1.57191", x="0.24", y="-6.26", z="0.033"/>
uu</shot>
. . .
```

```
</point>
```

# Description

Data :

- from 2003 to 2008
- 87 grand slam tournaments
- 1729 matches
- 262,596 points

Task :

- decode Magnus effect
- analyze performance for men and women
- focus on serve

#### About the surface

surface	1st serve	2nd
INDOORS	72.01	53.03
GRASS	71.19	54.85
HARD	68.34	52.68
CLAY	66.28	52.24

TABLE : Winning percentage

#### ➡ INDOORS » GRASS » HARD » CLAY

➡ The serve provides a great advantage

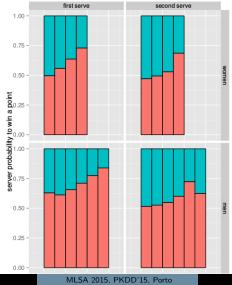
#### About the gender

gender	1st serve	2nd
women	62.85	49.43
men	71.00	54.18

TABLE : Winning percentage

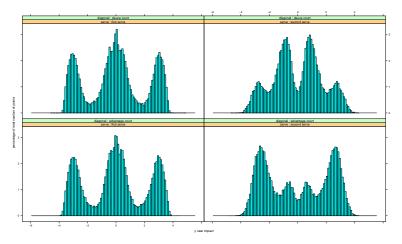
➡ still an advantage on the first serve

# Serve speed



What can reveal Hawk-Eye? MLSA 201

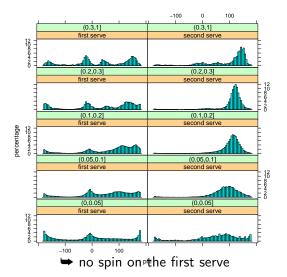
### **Distribution of impacts**



➡ Difference between deuce and advantage court

MLSA 2015, PKDD'15, Porto

### Distribution of the angle



What can reveal Hawk-Eye?

MLSA 2015, PKDD'15, Porto

# Conclusion

- painfull data cleaning
- a first analysis of big data
- confirmation of known results

Perspectives :

- impact of the number of strokes
- detection of routines