

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>
    <<<<xmldate d="Data"/>
    <<<<server p="CLIJSTERS"/>
    <<<<receiver p="HENINHARDENNE"/>
    <<<<positive p="HENINHARDENNE"/>
    <<<<serve_class c="1"/>
    <<<<scorer s="-1"/>
    <<<<PointDuration w="6.26786"/>
    <<<<score_raw s="10"/>
  <<</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"/>
  <<<</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

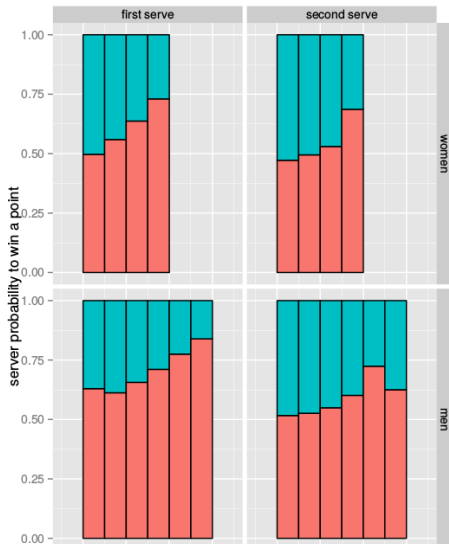
About the gender

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

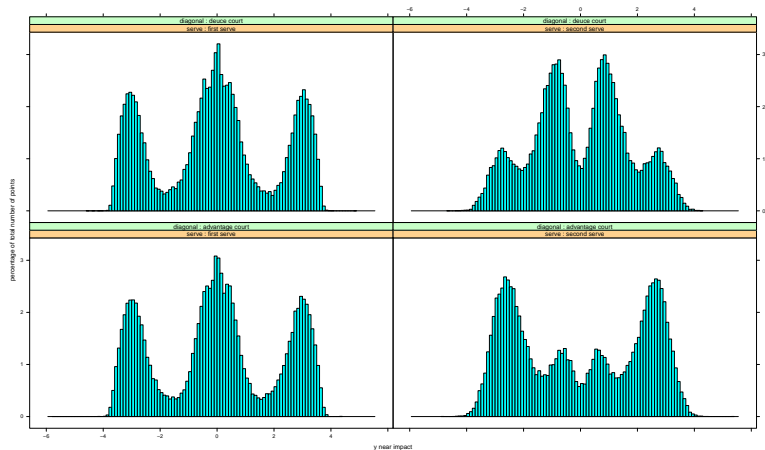
TABLE : Winning percentage

➡ still an advantage on the first serve

Serve speed

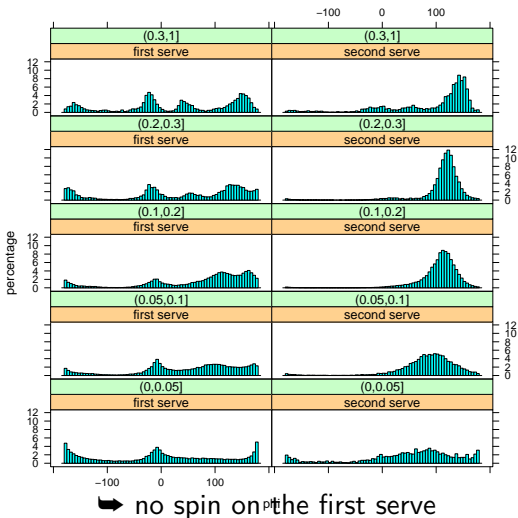


Distribution of impacts



➡ Difference between deuce and advantage court

Distribution of the angle



Conclusion

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

Perspectives :

- ▶ impact of the number of strokes
- ▶ detection of routines