Enhancing Viewer Engagement Using Biomechanical Analysis of Sport

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Sports Broadcasting

• Sports Broadcasting
• Biomechanics
• Our Background
• Biomechanics Prototypes
  – Stride Detection
  – Body Modelling
  – Cycling Cadence
  – Diving analysis
  – Web application
• Conclusions
Sports Broadcasting

Pundits are used to explain the intricacies of a sport to the viewers.

Some sports make good use of technology in their coverage.
Biomechanics

- Offers new opportunities for insight and analysis
- Some typical data:
Biomechanics

Number of strides

<table>
<thead>
<tr>
<th>Name</th>
<th>Number of Strides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolt</td>
<td>36</td>
</tr>
<tr>
<td>Gay</td>
<td>42</td>
</tr>
<tr>
<td>Powell</td>
<td>44</td>
</tr>
<tr>
<td>Bailey</td>
<td>50</td>
</tr>
<tr>
<td>Thompson</td>
<td>48</td>
</tr>
<tr>
<td>Chambers</td>
<td>46</td>
</tr>
<tr>
<td>Burns</td>
<td>42</td>
</tr>
<tr>
<td>Patton</td>
<td>48</td>
</tr>
</tbody>
</table>

Step Frequency

- Bolt
- Gay
- Powell
- Bailey
- Thompson

Reaction Time

Step Length

- Bolt
- Gay
- Powell
- Bailey
- Thompson

Graphs showing the number of strides, step frequency, step length, and reaction time for different athletes.
Our Background

• Sports analysis tools for sports including football, rugby and athletics
Our Background

- Line and feature tracking are used to provide camera calibration
Our Background

- Biomechanics offers a potential next stage of development

- The camera calibration is a base on which new tools can be built.
  - Some simple measurement tools are already in place:
Prototypes

- Stride Detection
- Diving Analysis
- Web Application
- Cadence Measurement
- Body Modelling
Stride Detection

- A clean background is generated using a motion compensated temporal media filter
Stride Detection

- A smaller filter window causes the temporarily stationary foot to “burn” into the background.
Stride Detection

- The foot should be the main difference between the two backgrounds
Stride Detection
Body Modelling

Camera calibration is combined with assumptions about movement to extract 3D positions of body parts from 2D annotation.

Positions are placed in a biomechanical model of the human body and extra data is extracted.
Body Modelling

- The data can then be used and visualised in various ways.
Cycling Cadence Measurement

- Simple tool to find the speed the cyclist is pedalling
Diving Analysis

- A move from qualitative to quantitative analysis.
- Segment images and measure
Diving Analysis

- Used by the BBC and NBC during the London Olympics
Web Application

- Using Flash to allow client side rendering of augmented reality graphics in the browser
Web Application

- We created a video player where the viewer can put themselves into the action
Web Application

- [http://www.bbc.co.uk/sport/0/olympics/19024989](http://www.bbc.co.uk/sport/0/olympics/19024989)
- 30,000 users since the start of the Olympics
Conclusions

• Many more possible tools making use of the field of biomechanics.

• They offer the viewer a deeper understanding of an event.

• Help to attract new audiences.

• The metadata produced and technologies such as the AR application open up potential new forms of content for the future.
Thanks

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Thanks

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Questions?