A Vision Based Anthropometric Scanner

Final Presentation

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Problem Statement

Buying a bicycle

http://www.wikihow.com/Buy-a-Bicycle

It’s not that simple!
Problem Statement

An optimum bicycle provides:

- Comfort
- Safety
- Injury prevention
- Peak performance

http://www.twowheelsgood.co.uk/fit-services.php
Our Approach

Fitting a bike to the customer based on pose estimation
Overview
Procedure breakdown

Training
Testing
Used through Matlab Engine
Take a picture
Estimate the pose
Calculate real length
Calculate body part sizes
Calculating Bike part sizes
Visualize results

Train DNN
Take a picture
Estimate the Human Pose
Calculate the length of body parts
Compute the structure of Bike
Visualize results

old customers

costumer

user/shopkeeper
Network Training

• Implemented in Matlab using MatConvNet.

• Convolutional Neural Network.

• Trained using the Leeds Sports Pose Dataset.
Camera Calibration

- Tens of images with checkerboard and Bicycle
- Intrinsic Camera Parameters calculated and stored
Pose Estimation

- Human region is cropped
- CNN validation
- 14*2 outputs extracted and drawn
Image to World

Real pose estimation

- Bicycle images collected
- Tires detected.
- Tires radiiuses and centers distance calculated
Bicycle parameters

- Human body parameters extracted
- Bicycle parameters calculated
  - Formulas
  - Tables
Bicycle parameters

\[ SH = R \times 0.885 \]

\[ OR = (R + A) \times H - A \]

<table>
<thead>
<tr>
<th>Type</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touring</td>
<td>0.52</td>
</tr>
<tr>
<td>Sport</td>
<td>0.53</td>
</tr>
<tr>
<td>Racing</td>
<td>0.54</td>
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Roadbike.de magazine, 10, 2012
Dynamic fitting

- Pose on the bicycle
- Video Capturing
- Results were not satisfactory
Gantt Chart

- 17-Apr-2016
- 27-Apr-2016
- 7-May-2016
- 17-May-2016
- 27-May-2016
- 6-Jun-2016
- 16-Jun-2016
- 26-Jun-2016
- 6-Jul-2016
- 16-Jul-2016

- Reading Papers
- Understanding Previous Codes
- Camera Calibration
- Training & Testing the old algorithm
- Videos Data Collection
- Training & Testing the new algorithm
- Updating the GUI
- Visualisation
- Dynamic fitting
- Final Report

Created with Microsoft Excel
Project Outlook

- Create a customized dataset
- Retrain network
- Optical flow
Lessons Learned

- Deep Learning in action
- Connecting different parts
- Time management
- Work presentation

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July 13, 2016  Slide 16
Thank you for your attention!