Photo Synthesis through Computer Vision

Microsoft Innovation Day

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Our new technique automatically:
- segments image and assigns meaningful semantic labels

Learns from examples how to exploit patterns of:
- Texture
- Shape
- Context
Image Understanding

- Automatic labelling of images into semantic classes:

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>car</td>
<td>building</td>
</tr>
<tr>
<td>road</td>
<td>cow</td>
</tr>
<tr>
<td>grass</td>
<td>cat</td>
</tr>
<tr>
<td>water</td>
<td>flower</td>
</tr>
<tr>
<td>road</td>
<td>bicycle</td>
</tr>
</tbody>
</table>

Colours represent semantic object classes

*TextonBoost*

European Conference on Computer Vision 2006
Labelling Images

TextonBoost

Google Images  msn Search  YAHOO!

In-House Stock Photos

building  car  water  cow  cat  flower  building  bicycle
road  grass  road  road  road  road
Image Retrieval

- Semantic ‘paint’ interface:

  ![Semantic Photo Synthesis](image)

  - **painting tools**
    - **semantic canvas**
Image Retrieval

- Semantic ‘paint’ interface:
Photo Synthesis

“Synthesise a picture like this”

Semantic Photo Synthesis
Eurographics 2006
Photo Synthesis

semantic canvas query

example synthesis results
Photo Synthesis

semantic canvas query

example synthesis result
Photo Synthesis

semantic canvas query

example synthesis results
Conclusions

- We can now...
  - recognise types of objects in images
  - retrieve images from large databases
  - paint new images using semantics
Acknowledgements

- PhD sponsorship kindly provided by Microsoft Research Cambridge
- Joint work between:

  Matthew Johnson
  Gabriel Brostow
  Ognen Arandjelovic
  Vivek Kwatra
  Roberto Cipolla

  John Winn
  Carsten Rother
  Antonio Criminisi