Detail synthesis on terrain models using aerial images

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ViRVIG research group

VR for industrial assemblies

scientific visualization

crowd simulation

virtual heritage & scans

urban models

medical VR
My thesis

• Generation of highly detailed realistic terrain models from public data
My thesis

• Generation of highly detailed realistic terrain models from public data

elevation map  aerial image
Thesis topics

• Aerial image segmentation

Thesis topics

- Aerial image segmentation
- New information layers based on examples

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• Vegetation modeling and rendering


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• Aerial image segmentation

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• Vegetation modeling and rendering

• DEM enhancement
Terrain super-resolution through aerial imagery

- DEM resolutions are usually 10-30 m/pixel
- Aerial imagery resolution 1 m/pixel or better (e.g. Catalunya: 10-25 cm/pixel)

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Visual results
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DEM 15m  net output  DEM 2m
Visual results

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Visual results

DEM 15m  net output  DEM 2m
Does the net generalize?

- 10 terrains from Catalan Pyrenees
- 12 terrains from South Tyrol

Terrains excluded from training and validation
Does the net generalize?

- We trained 3 networks: only with Pyrenees, only with Tyrol, and both
- Measured RMSE w.r.t. 2m DEM on two terrains from each set

<table>
<thead>
<tr>
<th></th>
<th>RMSE (m)</th>
<th>Bilinear up</th>
<th>Bicubic up</th>
<th>Net (Pyrenees)</th>
<th>Net (Tyrol)</th>
<th>Net (Both)</th>
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<tbody>
<tr>
<td>Pyrenees Test 1</td>
<td>1.662</td>
<td>1.406</td>
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<td>(Bassiero)</td>
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<td>Pyrenees Test 2</td>
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<td>Tyrol Test 1</td>
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<td>1.122</td>
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