Menpo

A Comprehensive Platform for Parametric Image Alignment and Visual Deformable Models

A bunch of code to make iBUG research easier

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Supervised by Stefanos Zafeiriou
Topics

• What Menpo does
• Why we made Menpo
• A tour of the Menpo Libraries
• Demonstration
• How iBUG researchers can use Menpo
• Upcoming talks
**Semantic Image Analysis**

**Behavioural Analysis**
- Is this person happy?
- How interested is this person?
- Does this person have a medical disorder?
- Is this person lying?

**Feature Point Tracking**
- How does the nose tip move in this video?

**Recognition**
- Is this James Booth?

**Reconstruction**
- How would this person look in 3D?
- How would this sad person look if they were happy?
Menpo is not specific to faces
Motivation

- iBUG 💌 Matlab
- Each researcher prepares for papers independently
- Isolated scripts, not reusable frameworks
- Our dream in 2012:
  - What if we had a shared, well tested, ever improving codebase that we all collaborated on?
  - If we did we’d call it Menpo!
Why Python? - the best of both worlds

- C#
- C++
- Java
- Ruby

- Matlab
- Julia
- Octave
- Mathematica

General Purpose Language

Interactive Linear Algebra
APPLICATIONS

- emotion detector
- facial point tracker
- automatic image annotation

RESEARCH

- boothiccv2016

MENPO LIBRARIES

- menpofit
- menpo3d
- menpodetect
- menpo
menpo

**IO**
- .JPG
- .PNG
- .BMP
- .TIFF
- ...
- .PTS
- .LM2
- .GIF
- .LAN
- ...

**Images**
- Image
- MaskedImage

**Transforms**
- Affine
- Homogeneous
- Procrustes
- ThinPlateSplines
- PiecewiseAffine
- ...

**Statistical Models**
\[ x^* = \bar{x} + \sum_i \alpha_i x_i \]

**Shapes**
- PointCloud
- TriMesh
- PointTree
- ...

**Landmarks**

**Visualization**

**Vectorization**
- .as_vector()
- .from_vector()
Vectorization

Vector space

\[ \bullet \quad v_1 \quad \rightarrow \quad f(v_1) \quad \rightarrow \quad v_2 \]

Image space

\[ \text{img1.as\_vector()} \quad \rightarrow \quad \text{img1} \quad \rightarrow \quad \text{img2} \]

arbitrary linear algebra
Blending the best from the scientific software community and contributing back
Demo

Patrick
<table>
<thead>
<tr>
<th><strong>Python</strong></th>
<th><strong>Command Line Interface</strong></th>
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<tbody>
<tr>
<td>Access full power of Menpo</td>
<td>Simple interface for common Menpo operations</td>
</tr>
<tr>
<td>Long term strategy to make your future research easier</td>
<td>Short term - no need to learn Python!</td>
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<tr>
<td>Learn a powerful new language (useful outside of research)</td>
<td>Great for comparing against methods</td>
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<tr>
<td>Learn a new language</td>
<td>Only scratches the surface of what’s possible</td>
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<tr>
<td>Can’t easily leverage existing code (<em>do you need it?</em>)</td>
<td>Cannot contribute back to improve Menpo</td>
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Upcoming talks

- Held with either ACM Student Chapter/IC Python
- Aim - Improve software engineering in research

<table>
<thead>
<tr>
<th>Python</th>
<th>Git (Version Control)</th>
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<tr>
<td>Python basics</td>
<td>Git basics</td>
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<tr>
<td>Python for Matlab users</td>
<td>Collaborating with Github</td>
</tr>
<tr>
<td>Menpo basics</td>
<td>Advanced Git</td>
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<td>Advanced Python</td>
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Site: menpo.org
Code: github.com/menpo
Google Group: menpo-users
Licence: New BSD
Unit tests: 500+

<table>
<thead>
<tr>
<th>menpo</th>
<th>menpo3d</th>
<th>menpodetect</th>
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<tbody>
<tr>
<td>v0.4.4</td>
<td>v0.1.0</td>
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menprofit v0.1.0