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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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?

Object Detection

where is the face in this image?

Feature Point Localisation

where is the nose-tip in this image?

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

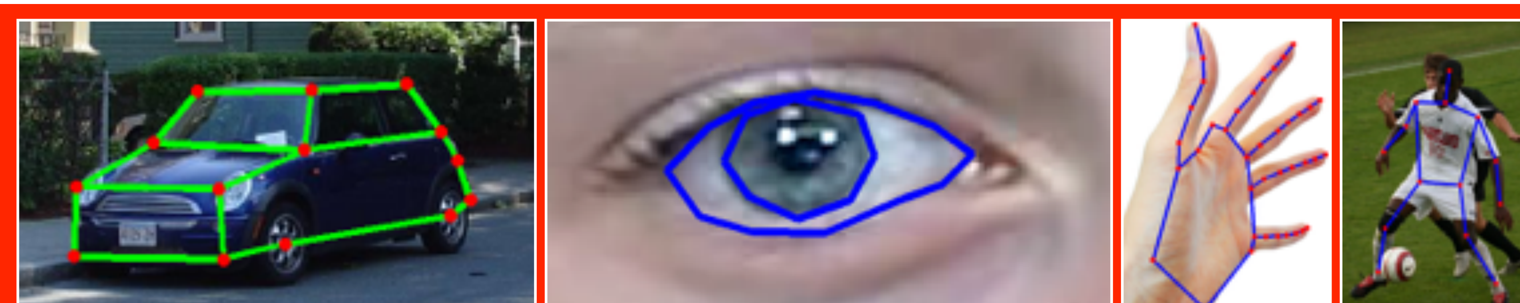
is this James Booth?

Reconstruction

how would this person look in 3D?

how would this sad person look if they were happy?

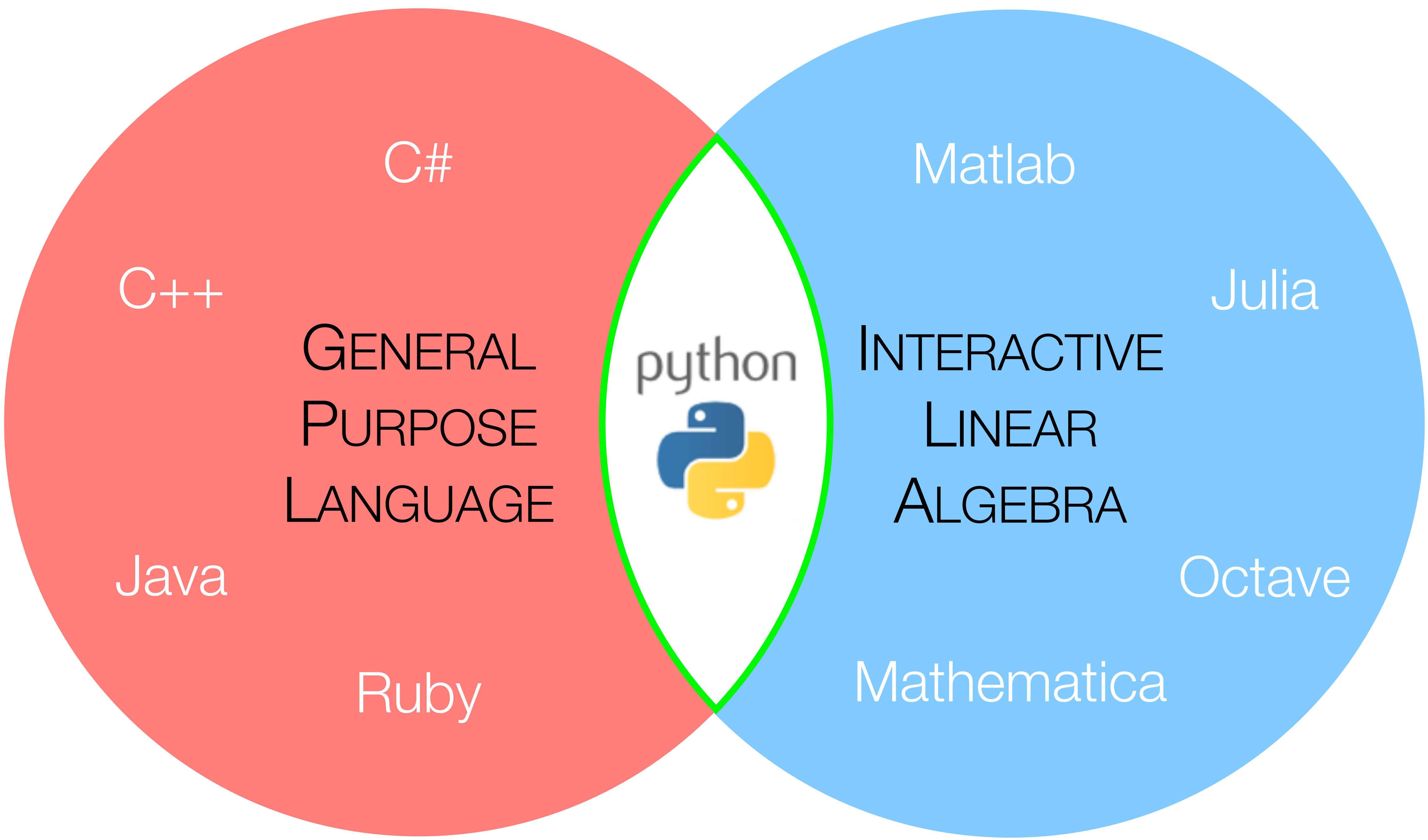
! Menpo is not specific to faces

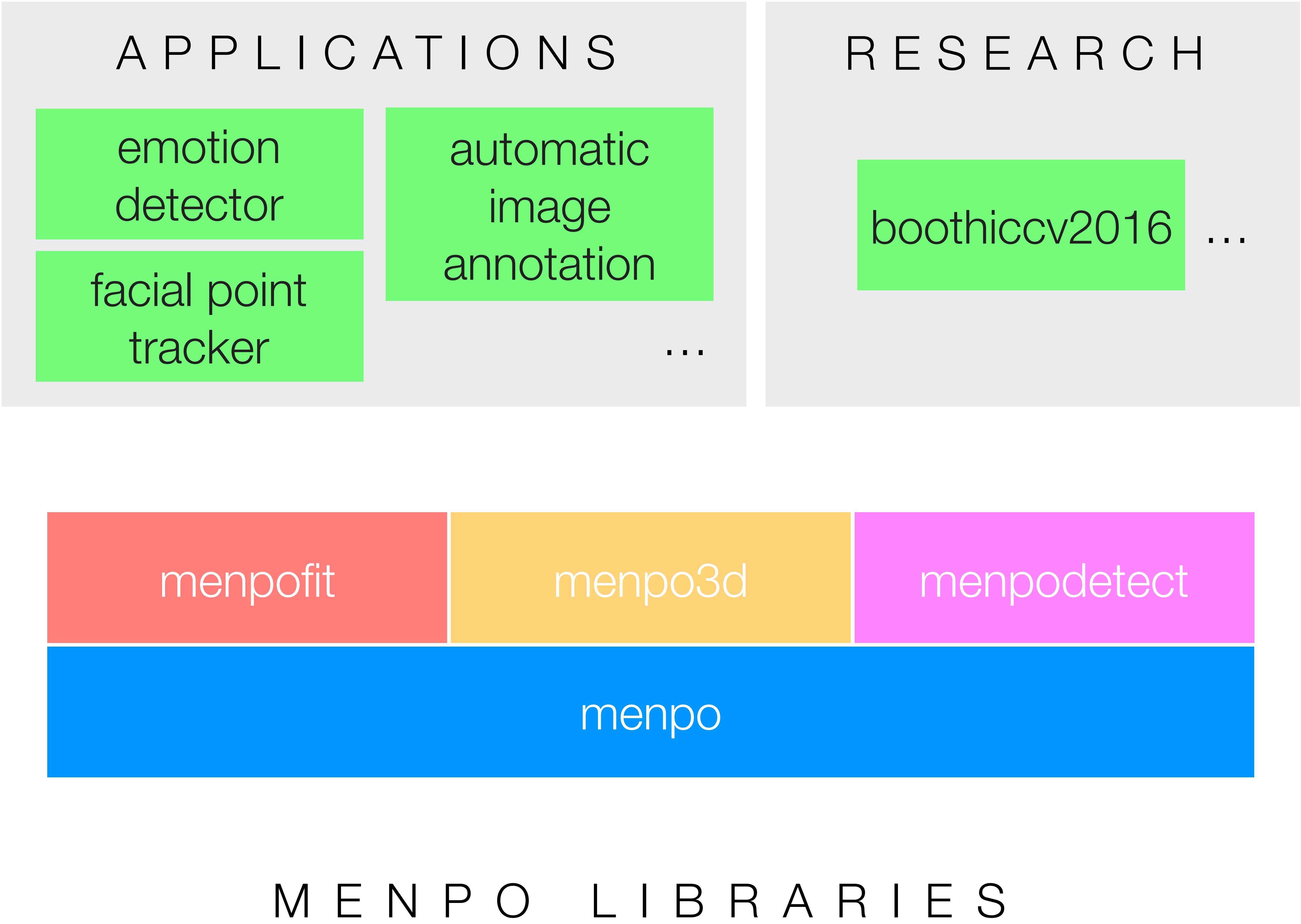


Motivation

- 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*




APPLICATIONS
emotion detector
automatic image annotation
facial point tracker
...
RESEARCH
boothiccv2016
...
menpofit
menpo3d
menpodetect
menpo
MENPO LIBRARIES

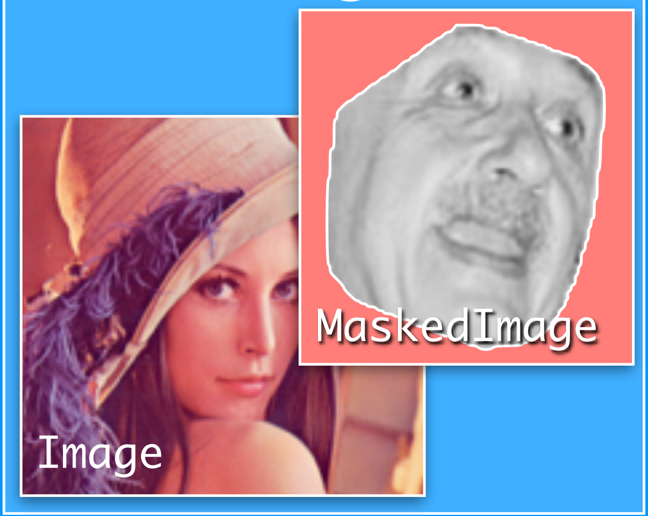
menpofit | menpo3d | menpodetect

menpo

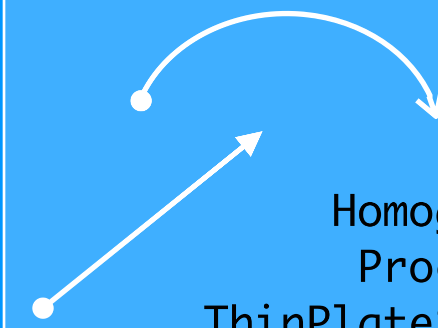
IO

.JPG .PTS
.PNG .LM2
.BMP .GIF
.TIFF .LAN
... ...

Images



Transforms

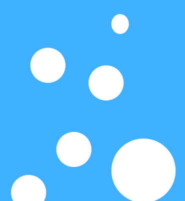


Affine
Homogeneous
Procrustes
ThinPlateSplines
PiecewiseAffine
...

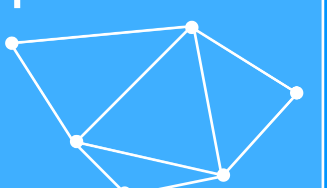
Statistical Models

$$x^* = \bar{x} + \sum_i \alpha_i x_i$$

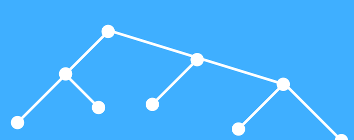
Shapes



PointCloud



TriMesh

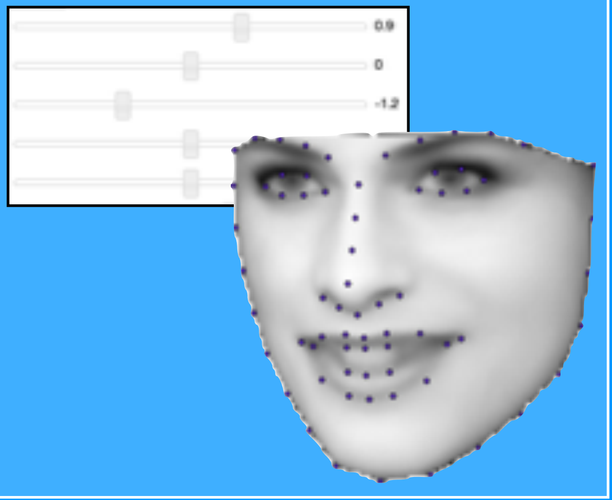


PointTree

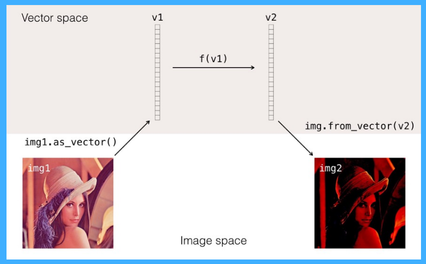
...

Landmarks

Visualization

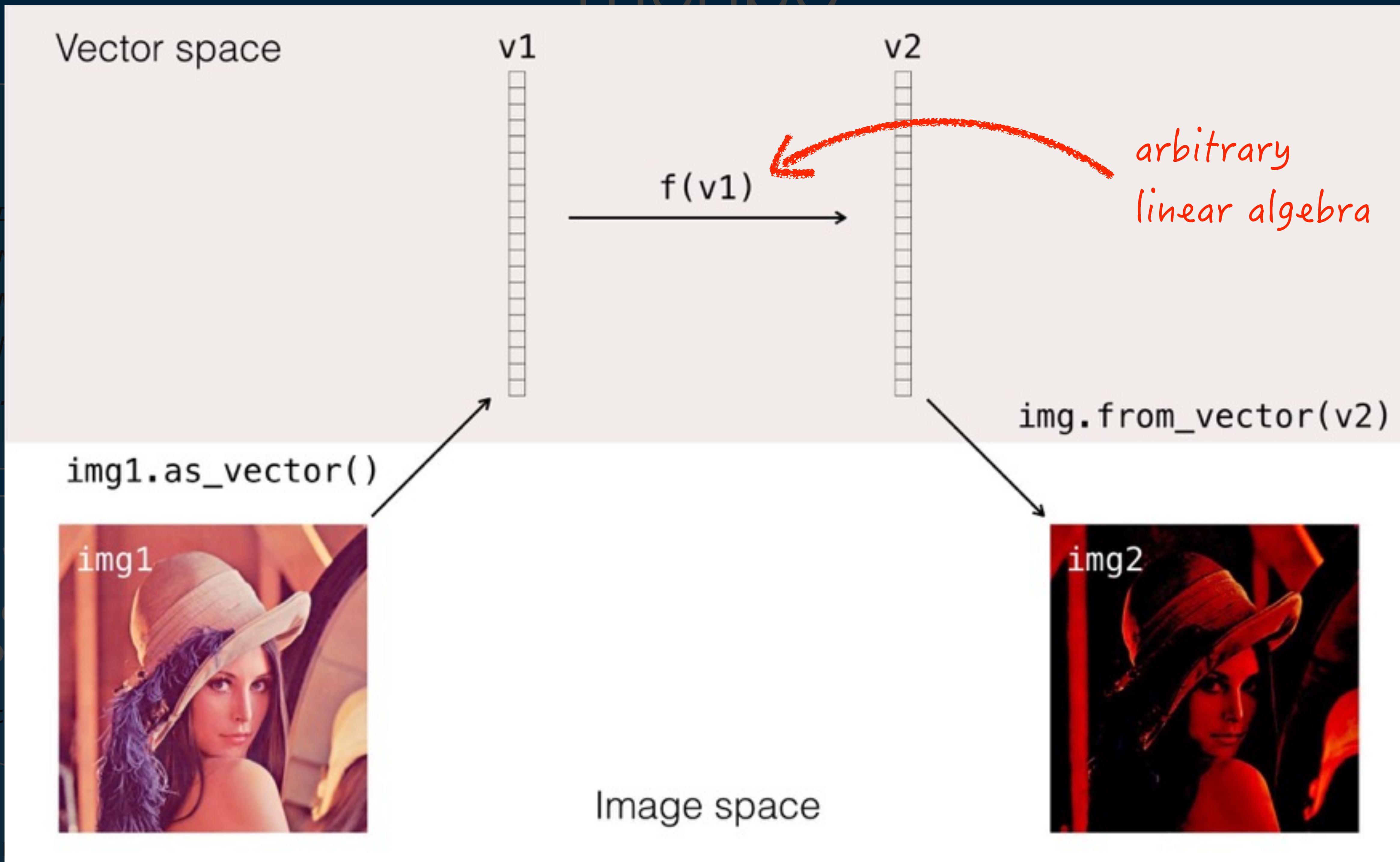


Vectorization

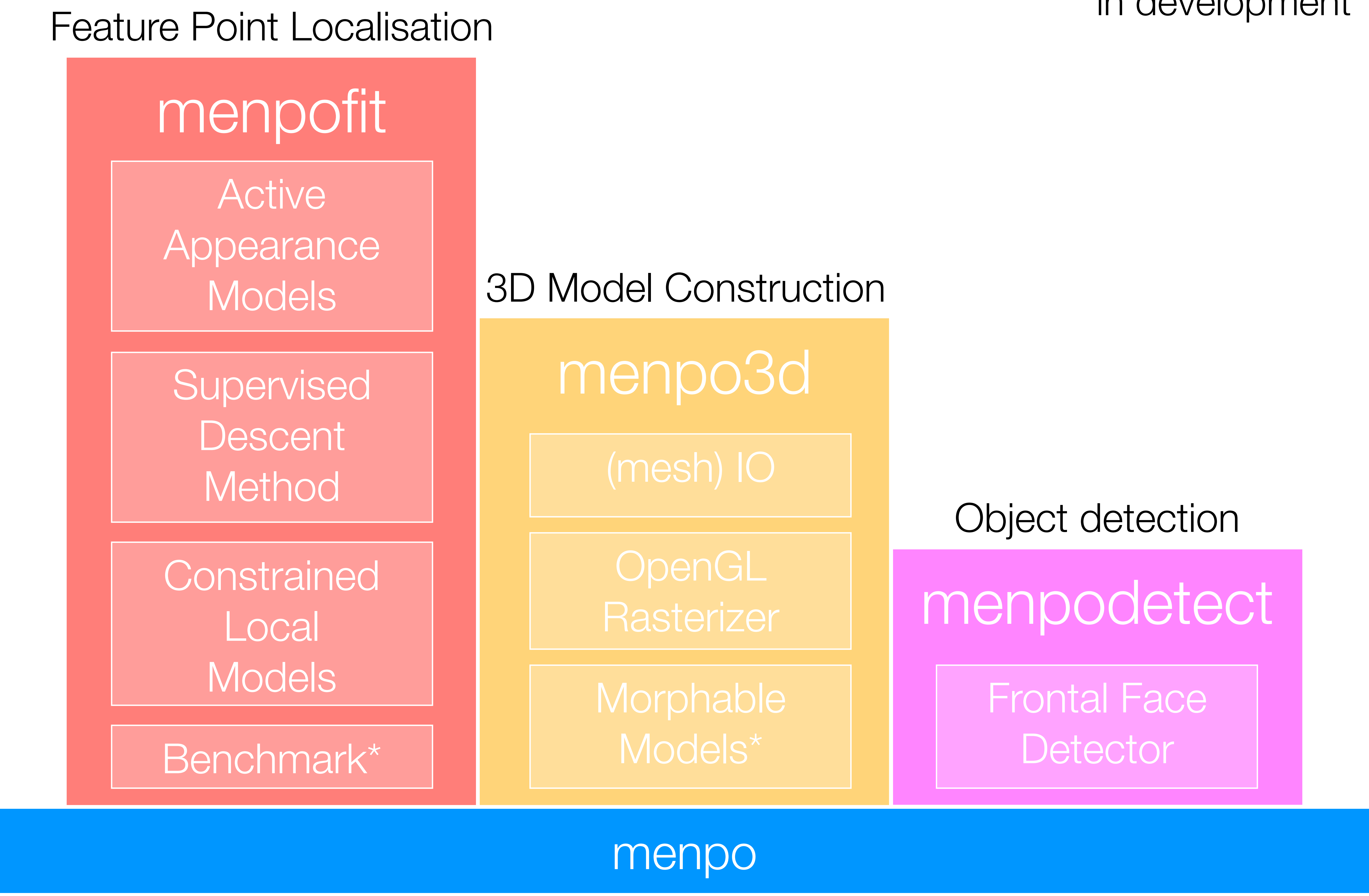


.as_vector()
.from_vector()

Vectorization



*in development



M E N P O L I B R A R I E S

SciPy	matplotlib	Mayavi	scikit learn
computation	2D plotting	3D plotting	machine learning
PIL	Assimp	Dlib	IP[y]: IPython Interactive Computing / jupyter
image importing	3D asset importing	object detection	interactive computing
GLFW	scikit-image	VLFeat.org	Anaconda
OpenGL management	image warping	image features	dependency management

Blending the best from the scientific software community

and contributing back

Adaptive and Constrained Algorithms for Inverse Compositional Active Appearance Model Fitting

Parametric Image Alignment Using Enhanced Correlation Coefficient Maximization

Supervised Descent Method and its Applications to Face Alignment

Deformable Model Fitting by Regularized Landmark Mean-Shift

Lucas-Kanade 20 Years On: A Unifying Framework

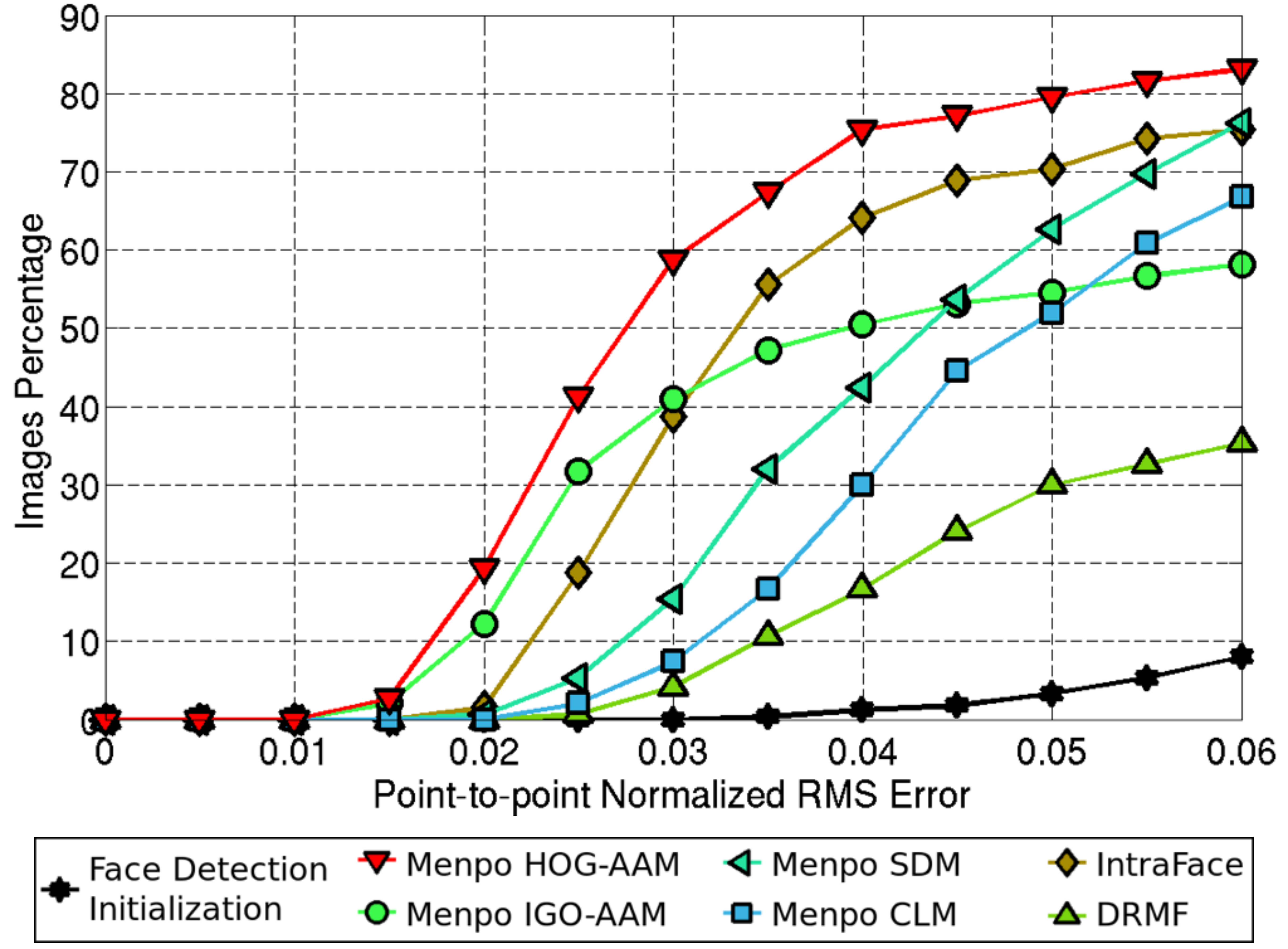
Robust and Efficient Parametric Face Alignment

Generic Active Appearance Models Revisited

Active Appearance Models Revisited

Implemented Research

Unified design accentuates similarities across papers



Images Percentage
Point-to-point Normalized RMS Error
0
10
20
30
40
50
60
70
80
90
0
0.01
0.02
0.03
0.04
0.05
0.06
Face Detection Initialization
Menpo HOG-AAM
Menpo IGO-AAM
Menpo SDM
Menpo CLM
IntraFace
DRMF

Demo

Patrick

Python	Command line interface
Access full power of Menpo Long term strategy to make your future research easier Learn a powerful new language (useful outside of research)	Simple interface for common Menpo operations Short term - no need to learn Python! Great for comparing against methods
Learn a new language Can't easily leverage existing code (*do you need it?*)	Only scratches the surface of what's possible Cannot contribute back to improve Menpo

Upcoming talks

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

Python

- *Python basics*
- *Python for Matlab users*
- *Menpo basics*
- *Advanced Python*

Git (Version Control)

- *Git basics*
- *Collaborating with Github*
- *Advanced Git*

Site: menpo.org
Code: github.com/menpo
Google Group: menpo-users
Licence: New BSD
Unit tests: 500+

menpofit v0.1.0	menpo3d v0.1.0	menpodetect v0.1.0
menpo v0.4.4		