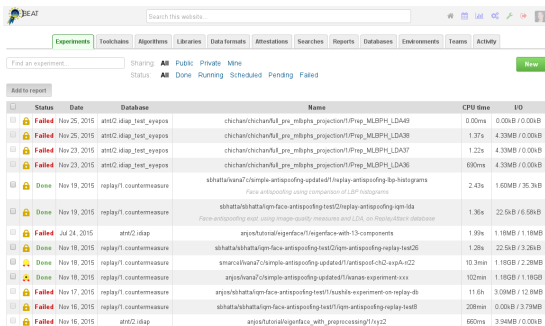


BEAT - Reproducible Open Science

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The screenshot shows the BEAT platform interface. At the top, there is a search bar and navigation tabs for Experiments, Toolchains, Algorithms, Libraries, Data formats, Attachments, Searches, Reports, Databases, Environments, Teams, and Activity. Below the navigation, there are filters for 'Find an experiment...' and 'Status' (All, Done, Running, Scheduled, Pending, Failed). A 'New' button is also present. The main content is a table with columns for Status, Date, Database, Name, CPU time, and I/O. The table lists various experiments, some of which are marked as 'Failed' or 'Done'.

Status	Date	Database	Name	CPU time	I/O
Failed	Nov 25, 2015	atnt2 idiap_test_eyepos	chichan/chichan/f1_pre_milphis_projection/f1/Prep_MLBPH_LDA49	0.00ms	0.00kB / 0.00kB
Failed	Nov 25, 2015	atnt2 idiap_test_eyepos	chichan/chichan/f1_pre_milphis_projection/f1/Prep_MLBPH_LDA38	1.37s	4.33MB / 0.00kB
Failed	Nov 23, 2015	atnt2 idiap_test_eyepos	chichan/chichan/f1_pre_milphis_projection/f1/Prep_MLBPH_LDA37	1.22s	4.33MB / 0.00kB
Failed	Nov 23, 2015	atnt2 idiap_test_eyepos	chichan/chichan/f1_pre_milphis_projection/f1/Prep_MLBPH_LDA36	690ms	4.33MB / 0.00kB
Done	Nov 18, 2015	replay1 countmeasure	shhata/kanas7/compare-antispooing-updated/1/replay-antispooing-fp-histograms Face antispooing using comparison of LBP histograms	2.43s	1.60MB / 36.3kB
Done	Nov 19, 2015	replay1 countmeasure	shhata/shhata/ign-face-antispooing-test/2/replay-antispooing-ign-lda Face-antispooing exp. using image-quality measures and LDA, on ReplayAttack database	1.36s	22.5kB / 6.58kB
Failed	Jul 24, 2015	atnt2 idiap	arjes/tutorial/ign/face/1/ign/face-with-13-components	1.99s	1.18MB / 1.18MB
Done	Nov 18, 2015	replay1 countmeasure	shhata/shhata/ign-face-antispooing-test/2/ign-antispooing-replay-test26	1.28s	22.5kB / 3.25kB
Done	Nov 18, 2015	replay1 countmeasure	smarcas/kanas7/compare-antispooing-updated/1/antispooing-ch2-expA-wC2	10.3min	1.18GB / 2.28MB
Done	Nov 18, 2015	replay1 countmeasure	arjes/kanas7/compare-antispooing-updated/1/kanas-experiment-xxx	102min	1.18GB / 1.18GB
Failed	Nov 17, 2015	replay1 countmeasure	arjes/shhata/ign-face-antispooing-test/1/ausible-experiment-on-replay-db	11.6h	3.09MB / 12.8MB
Failed	Nov 16, 2015	replay1 countmeasure	shhata/shhata/ign-face-antispooing-test/1/ign-antispooing-replay-test8	208min	0.00kB / 3.79MB
Failed	Nov 16, 2015	atnt2 idiap	arjes/tutorial/ign/face/with_preprocessing/1/ry2	660ms	3.94kB / 0.00kB

<https://www.beat-eu.org/platform/>

An open-source web-based platform to:

- ▶ conduct **reproducible** software-based computer experiments
- ▶ **certify** results and preparing publication-ready assets
- ▶ coordinate **challenges** with precise objectives
- ▶ share and develop code **socially**
- ▶ allow access to data, but ensure **privacy** and confidentiality

atnt / 2

[Search experiments](#)

The [AT&T Database of Faces](#), (formerly 'The ORL Database of Faces'), contains a set of face images taken between April 1992 and April 1994. The database was used in the context of a face recognition project carried out at Cambridge University <<http://www.cam.ac.uk/>>

There are ten different images of each of 40 distinct subjects. For some subjects, the images were taken at different times, varying the lighting, facial expressions (open / closed eyes, smiling / not smiling) and facial details (glasses / no glasses). All the images were taken against a dark, homogeneous background with the subjects in an upright, frontal position (with tolerance for some side movement).

A preview image of the Database of Faces is shown below

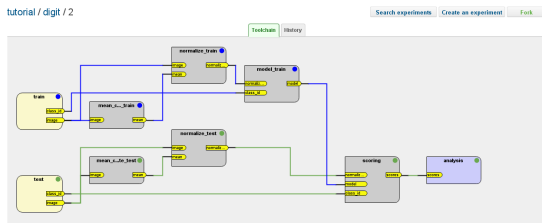


<https://www.beat-eu.org/platform/databases/atnt/2/>

1. Databases and specific usage protocols are input into the computing backend by platform administrators
2. Users create workflows and algorithms to address a particular problem
3. The platform runs user toolchains and algorithms **respecting usage protocols**
4. Results are stored and indexed, so you can create leader boards and keep track advances

◦ train		
image:	system/array_2d_uint8/1	Two-dimensional array of 8 unsigned integer values:
file_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
client_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
◦ templates		
image:	system/array_2d_uint8/1	Two-dimensional array of 8 unsigned integer values:
file_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
client_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
template_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
◦ probes		
image:	system/array_2d_uint8/1	Two-dimensional array of 8 unsigned integer values:
client_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
file_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
probe_id:	system/uint64/1	Basic format containing only a single unsigned integer (64 bits) value:
template_ids:	system/array_1d_uint64/1	Basic format containing a one-dimensional array of unsigned integer (64 bits) values

- ▶ Composed of any type of raw data and (at least one) usage protocol
- ▶ A protocol defines:
 - ▶ how to use the data: e.g. train, validation, test
 - ▶ associations between raw and meta data (e.g. *this label belongs to that image*)
- ▶ Data is **sequestered** inside the platform (only directly accessible by admins)
- ▶ Following the usage protocol, data is fed into user toolchains for processing at a backend
- ▶ Present limitation: raw data must be Python-readable



<https://www.beat-eu.org/platform/databases/atnt/2/>

- ▶ Express data flow, from the raw data to analysis
- ▶ Define possible places where **algorithms** may be implemented
- ▶ Versionable, trackable (start from the work of others)
- ▶ Easy to draw **at the platform**

tutorial / pca / 2

Search experiments Fork

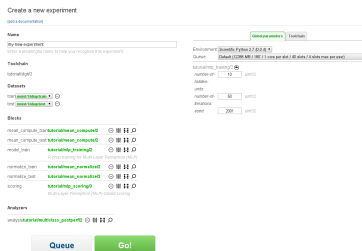
Principal Component Analysis (PCA) [\(more\)](#)

```
1 import bob
2 import numpy
3
4
5 class Algorithm:
6
7     def __init__(self):
8         self.data = []
9
10
11     def setup(self, parameters):
12         self.number_of_components = parameters['number-of-components']
13         return True
14
15
16     def process(self, inputs, outputs):
17         self.data.append(inputs["image"].data.value.astype('float64').flatten())
18
19         if not(inputs.hasIOWData()):
20             self.data = numpy.vstack(self.data)
21
22         trainer = bob.trainer.PCATrainer()
```

<https://www.beat-eu.org/platform/algorithms/tutorial/pca/2/>

- ▶ Implement functionality (a.k.a. *the meat*) of toolchains
- ▶ Versionable, trackable, confidential
- ▶ Can be *potentially* written in any language
 - ▶ Current limitation: A python backend exists
 - ▶ Future collaborations: Matlab, Binary, Julia, ...

Experiments



- ▶ Where everything comes together: database, protocols, toolchains and algorithms
- ▶ Fully automated: only components that fit together can be chosen
- ▶ Hybrid by design: block X may run on a Python backend, block Y on another!
- ▶ Automatic parallelisation
- ▶ Configurable e-mail notification
- ▶ Automatic data caching
- ▶ Easily reproducible (no hidden parameters, fully tracked)

anjos / eigenfaces Save on Save

Filters

Individual (containing) (having properties) 0 0 0

ISO19516 (containing) (having property 'anjos')

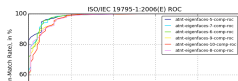
Algorithm name (containing) (having) 0 0 0

Apply

Results (5)

Processor: anjos-164p
Algorithm: katan@anjospart_anjos

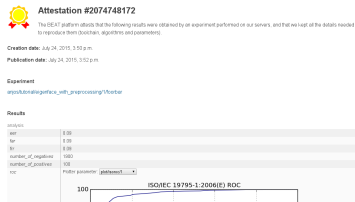
Experiment	Pr	Se	AUC
ISO19516 / eigenfaces / anjos-164p-164p	0.95	0.95	0.95
ISO19516 / eigenfaces / anjos-164p-164p	0.95	0.95	0.95
ISO19516 / eigenfaces / anjos-164p-164p	0.97	0.97	0.97
ISO19516 / eigenfaces / anjos-164p-164p	0.95	0.95	0.95
ISO19516 / eigenfaces / anjos-164p-164p	0.95	0.95	0.95



<https://www.beat-eu.org/platform/search/anjos/eigenfaces/>

- ▶ Start searching from anywhere in the site
- ▶ User filters to refine your search
- ▶ Display plots and rank tables
- ▶ Save and re-run a search when necessary
- ▶ Upcoming: leaderboards and automatic notifications

How does it compare to others?



BEAT features the following:

- ▶ Data: sequestered inside the platform (participants may access the data publicly if owner wishes so)
- ▶ Unique certification procedure for results (paper reviewing supported)
- ▶ Reproducibility by design: all details of certified experiments are kept (code, parameters, toolchains, datasets, ...)
- ▶ Privacy by design: all interactions are kept private until the user wishes to share them
- ▶ Open source: create your own platform

The near future

Some features we're currently working on:

- ▶ Leaderboards
- ▶ Built-in tutorials and user-guides
- ▶ First public release: February/2016

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Can I try it? **absolutely YES**

- ▶ sign up now: <https://www.beat-eu.org/platform/signup/>
- ▶ discuss:
<https://groups.google.com/forum/#!forum/beat-devel>