The AstroDAbis Tagging Service: tags and cross-matches for remote catalogues

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The short version

Astronomers are very good at sharing data, but poorer at sharing knowledge. The AstroDAbis service helps share two types of knowledge:

- the results of, or input to, cross-matching algorithms, in the form of co-identifications or neighbour tables; and
- information about single objects, in the form of user-supplied tags.

The majority of astronomical data ends up in open archives, and access to these is being simplified by the development of the global Virtual Observatory (VO). This is a great advance, but the fundamental problem remains that these archives contain only basic observational data, whereas all the astrophysical interpretation of that data – which source is a quasar, which a low-mass star, and which an image artefact – is contained in journal papers, with very little linkage back from the literature to the original data archives. It is therefore currently impossible for an astronomer to pose a query like "give me all sources in this data archive that have been identified as quasars" and this limits the effective exploitation of these archives, as the user of an archive has no direct means of taking advantage of the knowledge derived by its previous users.

The AstroDAbis service aims to address this, in a prototype service enabling astronomers to record tags and cross-identifications in the AstroDAbis service, annotating objects in other catalogues. We have deployed two interfaces to the annotations, namely one astronomy-specific one using the TAP protocol, and a second exploiting generic Linked Open Data (LOD) and RDF techniques.

Input

There are two ways to add tags to single objects.

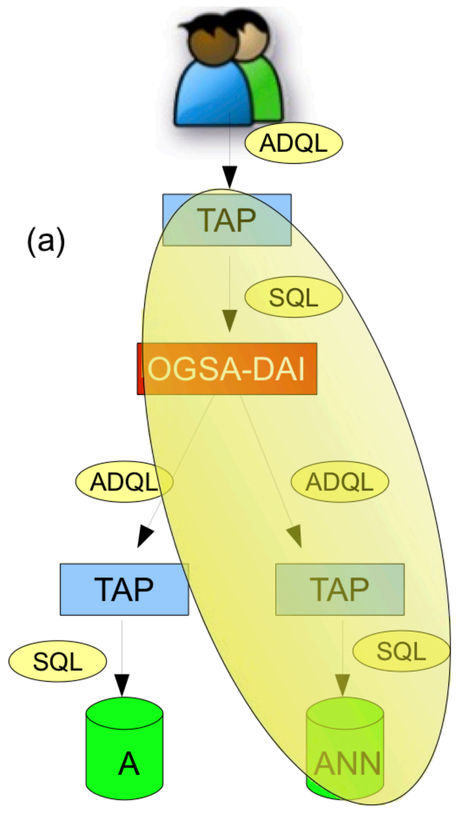
The service supports a web-based interface, which allows a user to enter templated queries (which expand to ADQL queries), tagging the objects which result.

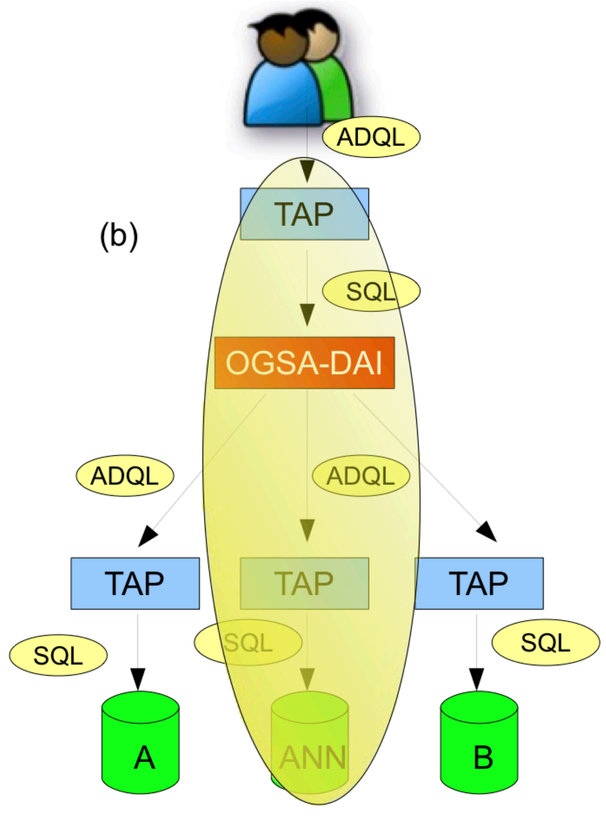
Alternatively (and more suitably for batch-mode or bulk annotation), users can upload annotations contained in a VOTable

```
SELECT TOP 100 masterObjID as pts_key,
  slaveObjID as objID,
  distanceMins as tagvalue
FROM twomass_pscXBestDR7PhotoObjAll
  <FIELD name='pts_key ID='masterObjID'
      ucd='meta.id;meta.main' datatype='long'>
    <DESCRIPTION>
      The unique ID in twomass_psc (=pts_key)
    </DESCRIPTION>
  </FIELD>
  <FIELD name='objID' ID='slaveObjId'
      ucd='meta.id;meta.dataset'
      datatype='long'>
    <DESCRIPTION>
      The unique ID of the neighbour
      in BestDR7..PhotoObjAll (=objID)
    </DESCRIPTION>
  </FIELD>
  <FIELD name='tagvalue' ID='distanceMins'
      ucd='pos.angDistance' datatype='float'
      unit='arcminutes' >
    <DESCRIPTION>
      Angular separation between neighbours
    </DESCRIPTION>
  </FIELD>
```

OGSA-DAI

OGSA-DAI is an innovative solution for distributed data access and management. It has been under development since 2002 and is now an established open source product currently managed by EPCC, The University of Edinburgh: `http://www.ogsadai.org.uk/`





In the configuration we are using, OGSA-DAI allows a user to run a query across multiple TAP services. The user submits an ADQL query to a local TAP service, which that service translates into SQL for submission to the OGSA-DAI server, which passes it on to a catalogue server, and the AstroDAbis annotation server, as appropriate.

Linked data and the Semantic Web

As well as the TAP-based interface, AstroDAbis has a 'Linked Data' interface (see `http://linkeddata.org`). Although this provides utility by itself, it has the incidental feature that it provides a mechanism for effectively creating URI-based *names* for the objects in the catalogues it annotates. These can act as a springboard for future experiments with the Semantic Web in astronomy.

Stand-off tagging

A key feature of the AstroDAbis service is that it enables astronomer users to annotate catalogues, and objects in catalogues, to which they have no write access. This creates the possibility of Web 2.0 or Semantic Web infrastructures without requiring catalogues to make the potentially disruptive changes to their systems which built-in annotation would demand.

By providing a simple annotation service, the AstroDAbis mechanism has the potential to support annotation of a very broad range of astronomical objects, in a very broad range of repositories.

Links

- `http://astrodabis.jiscinvolve.org`: canonical URL, but not much there
- `http://astrodabis.googlecode.com`: code – includes documentation wiki (soon)

Output

Since the AstroDAbis service exposes a TAP interface to the world, its annotation sets are available through ADQL interfaces such as the one illustrated on the left.

The TAP interface makes the AstroDAbis a first-class citizen in the VO, so that its users' annotations can be combined with information from other VO services to support high-level queries such as, for example, "find me the redshifts of all the objects which Fred Bloggs identifies as quasars".

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