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ESCAPE

Building the infrastructure for the next generation astronomy

Challenges

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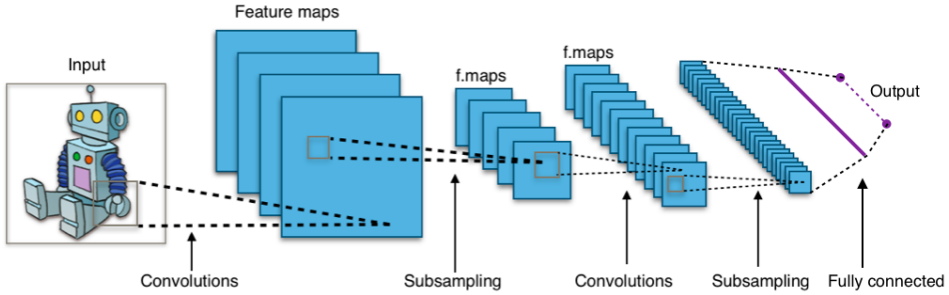

Image from Wikipedia

Big Data by Nick Youngson CC BY-SA 3.0 Alpha Stock Images

SKA SQUARE KILOMETRE ARRAY

LSST Large Synoptic Survey Telescope

We are hungry for data!

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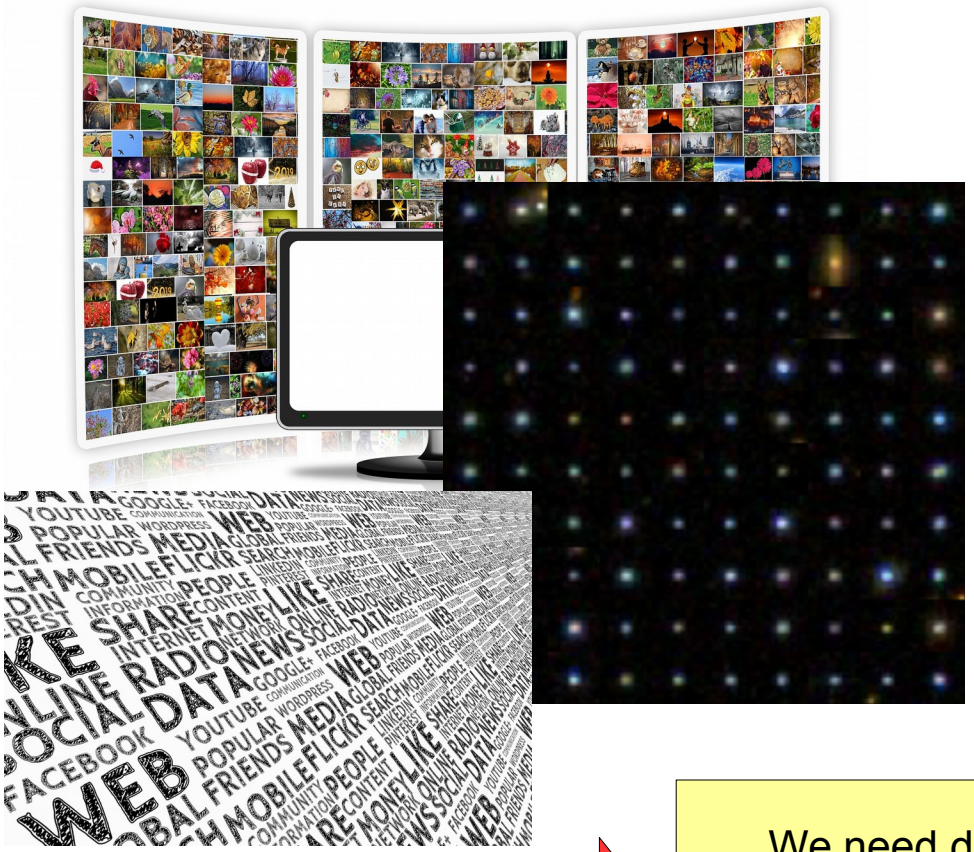

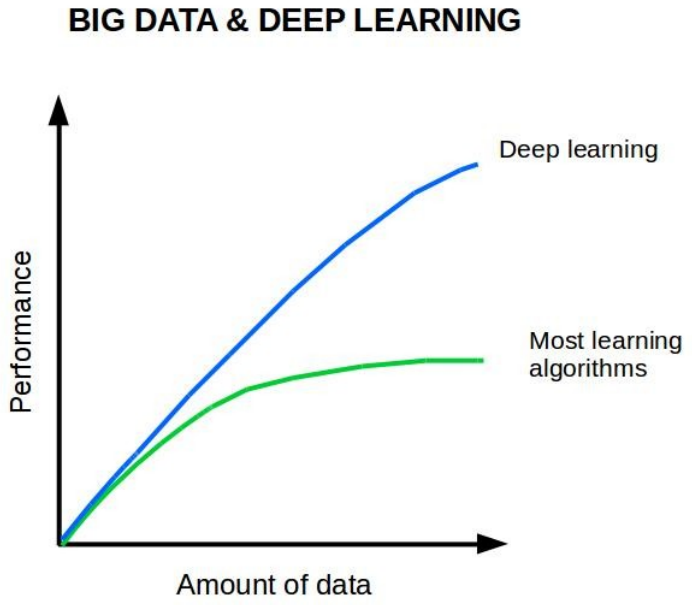

We need data,
we need standards,
we need tools!

ESCAPE project

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ESCAPE: European Science Cluster of Astronomy & Particle physics ESFRI research infrastructures

- Accessibility to huge amount of data provided by research infrastructures and facilities
- Bring together partners from astronomy and particle physics
- Deliver solutions to ensure integration of data, tools, services and software
- Build standards and ensure interoperability

Dimensionality reduction

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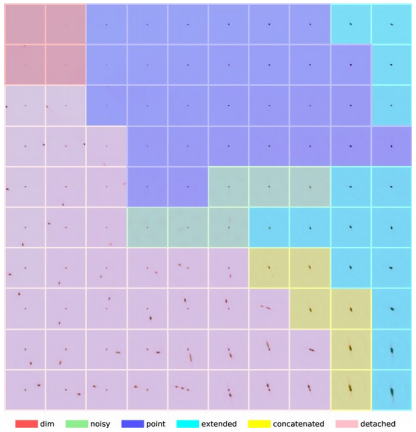
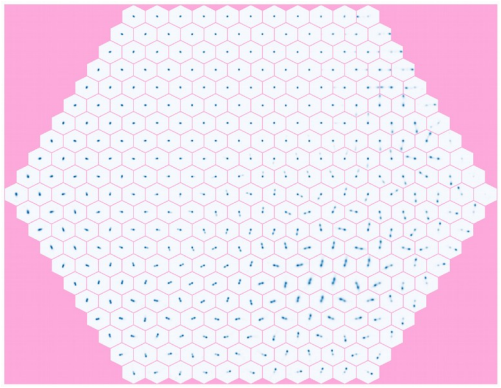
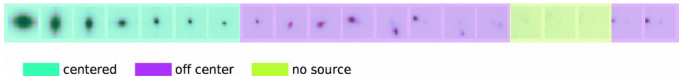
The story so far...

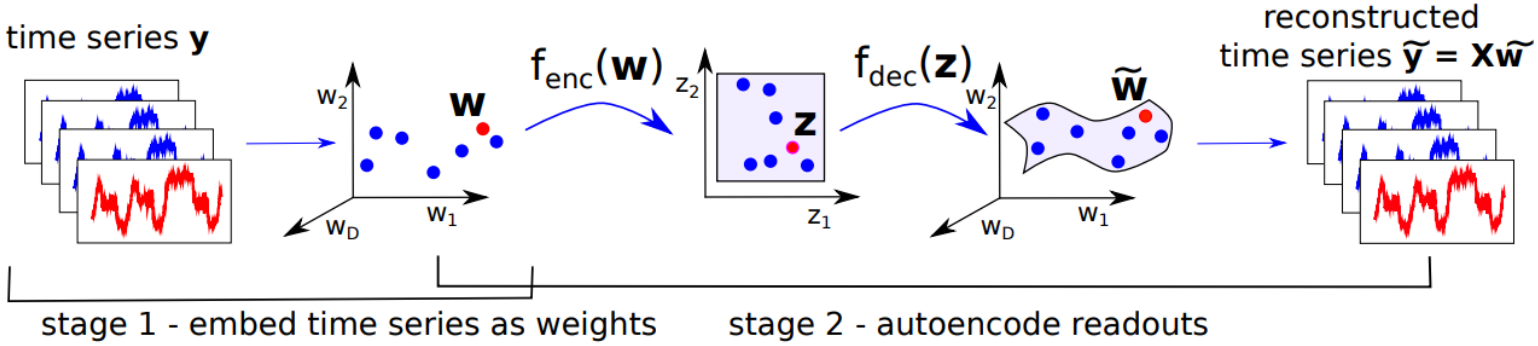
FIRST







UKIDSS



Challenges: data products

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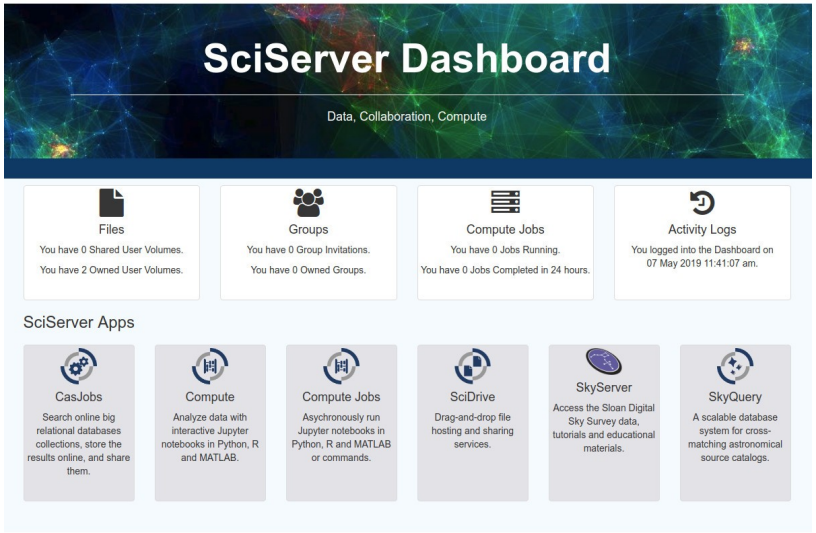
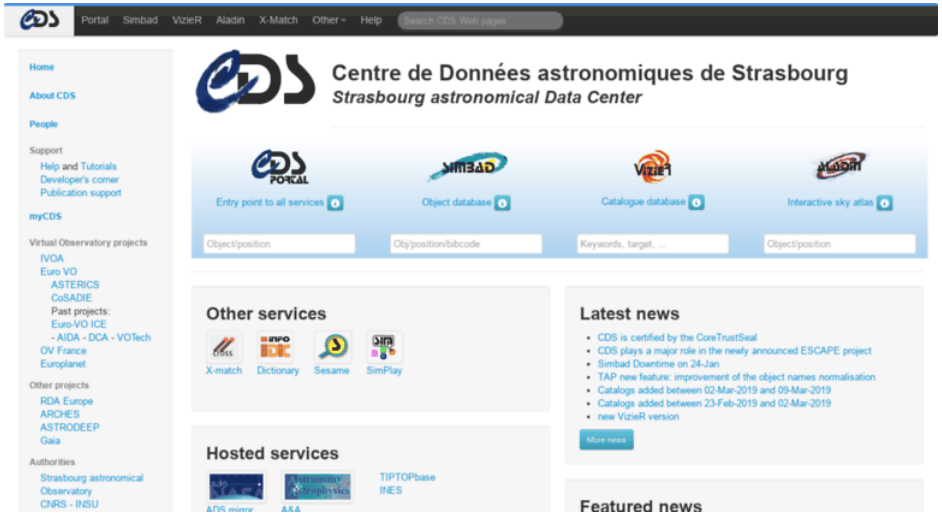
Working with catalogs is a simple task:





➡ Problems start with images and spectra!

Some “simple” tasks...

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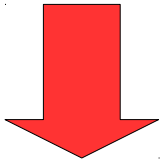
1. Given the coordinates, download 28x28 pixel^2 images for all the quasars in SDSS.

2. Download some hundreds of thousands of images from FIRST/UKIDSS.

3. Download all the HARPS spectra from ESO archive.



Obtaining data products can be a not easy task

Task 3 - Solutions?

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- Python script available on request, but frequent crashes experienced → required two months of attempts

- Alternative: direct shipping of hard drive

Asking friends and colleagues for data and support can be helpful, but it is not what standardization and the ESCAPE paradigm are about!

HARPS

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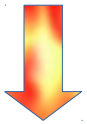
HARPS: the High Accuracy Radial velocity Planet Searcher at the ESO La Silla 3.6m telescope

267.487 high resolution spectra

→ multiple observations



7.535 unique spectra

Image from Wikipedia

First developments

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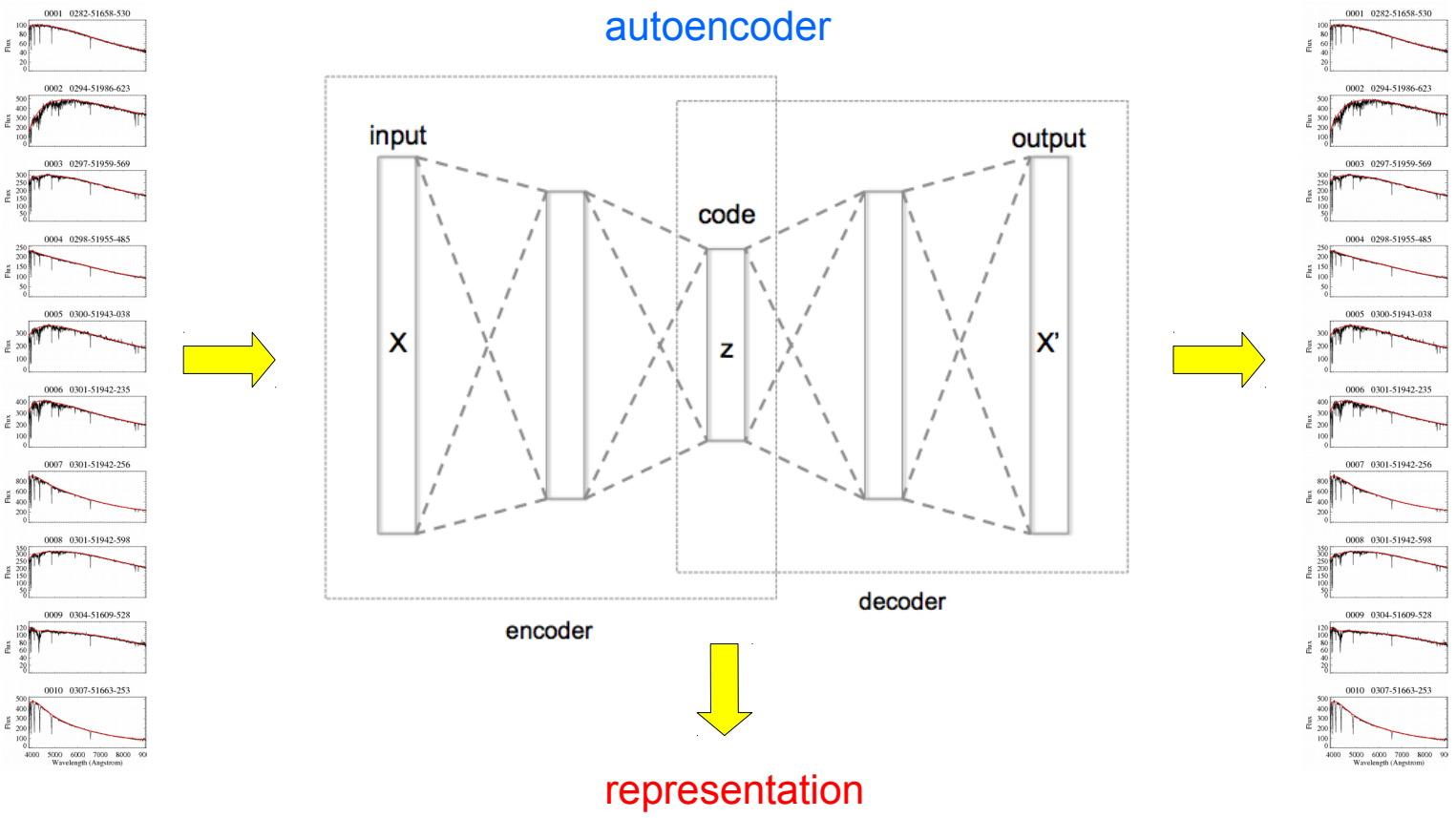
Development of a prototype for:

Dimensionality reduction and analysis of spectra



Prototype

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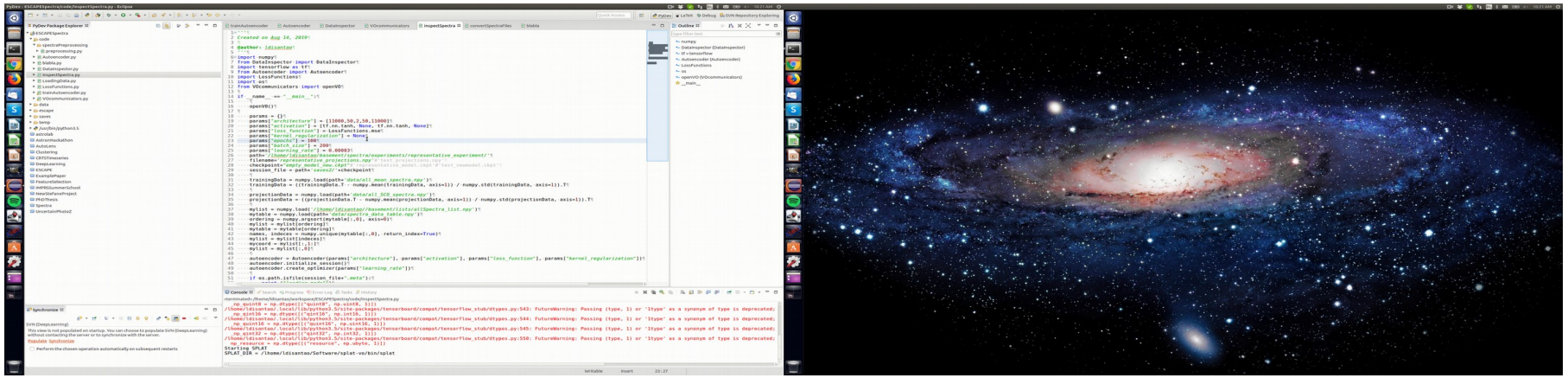

Conclusions

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- ESCAPE project is going to be a step to build a new infrastructure for data-intense astronomy.
- A lot of work to do:
  - data products access
  - building standards
  - bringing code to the data
- Development of a first prototype → big potential and future integration in web services → allowing to do a lot of science.
- Final question: are we ready for machine learning and big data?