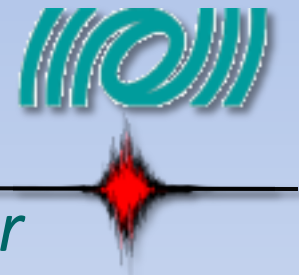# Machine Learning short course

Proposal for a Training school for GraWIToN
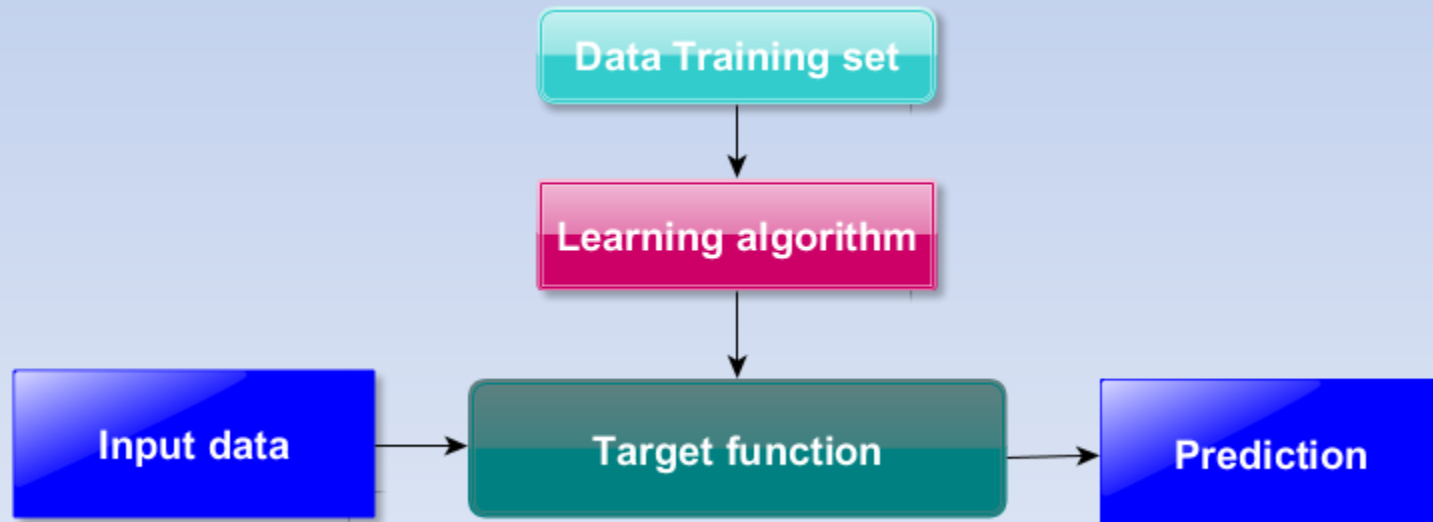
Elena Cuoco, EGO and INFN
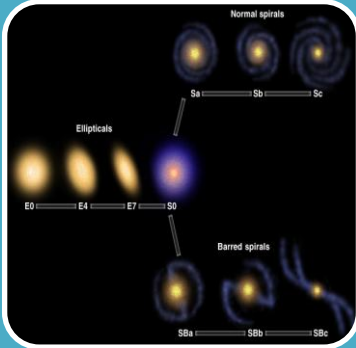
•Machine Learning is a key technology in Big Data and in many financial, medical, commercial and scientific applications.

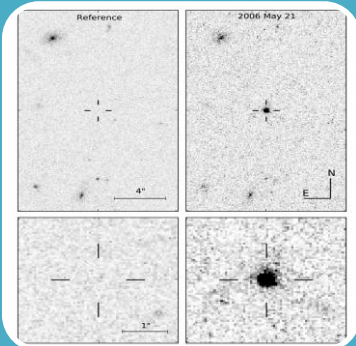•It is used to produces algorithms, tools to make predictions from data.

Big Data to analyze

- Useful for automatic classification (for example galaxy classification)
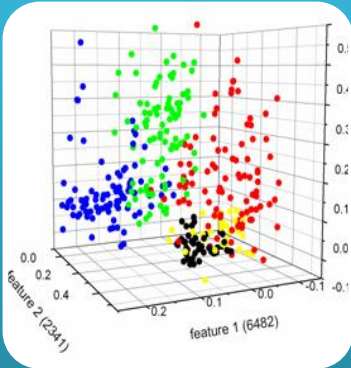

Image processing

- Useful for pattern recognition (transient events detection)
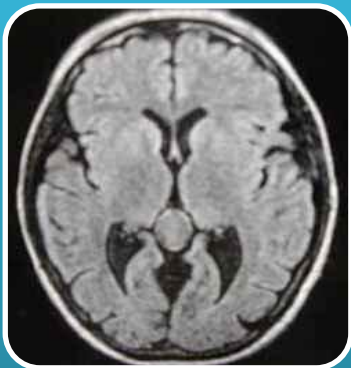
Elena Cuoco

Example: ML in Medical science

Statistical studies

- Classify groups of patients

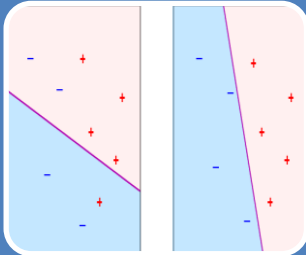## Imaging techniques

- Pattern recognition and image processing (NMR)
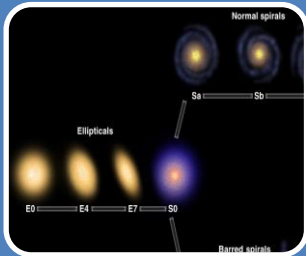
Elena Cuoco

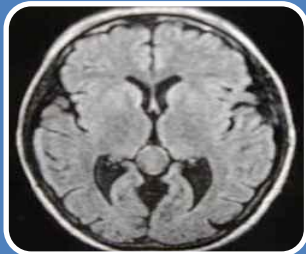# School objective

Multidisciplinary school

General introduction on ML concepts

- Supervised and unsupervised learning

ML in astronomy

- Useful Techniques for classification
- Applications (also to GW DA)

ML in medical science

- Image processing and pattern recognition
- Application

Program proposal

✓ Minimum duration: Three Days

  ✓ **First day**: General introduction on Machine learning techniques (with help of Ciro Cattuto)

  ✓ **Second day**: Applications in Astronomy and link with GW community (with help of Marica Branchesi)

  ✓ **Third day**: Pattern recognition and Medical science application (with help of Andrea Chincarini)

Elena Cuoco

Day prototype

9:00-11:00	Theory	Coffee-break
11:30-13:00	Theory	Lunch
14:30-16:30	Theory/exercises	Coffee-break
17:00-18:00	Exercises	end

Elena Cuoco

Collaborators

✓ <u>Marica Branchesi</u>: Researcher at Urbino University. In the steering committee and core team of the INAF project for EM follow-ups of GW triggers in the ADE

✓ <u>Ciro Cattuto</u>: Data Science Laboratory leader of the and Research Director of Institute for Scientific Interchange Foundation **(www.isi.it)**.

✓ <u>Andrea Chincarini</u>: INFN Researcher at Genova University and National coordinator of MIND (Medical imaging for Neurodegenerative Diseases)

✓ <u>Elena Cuoco</u>: EGO referent for Data Analysis and Virgo noise studies group coordinator

Elena Cuoco