



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación



Brainstorming Meeting on Machine Learning Applications

Marc Guevara, Alicia Sanchez



- Welcome
- Summary on the Atmospheric Comp. Group activities
- Summary on the Climate Prediction Group Activities
- Background in Machine Learning(ML) and study Cases
- Brief Introduction to ML Applications in Earth Sciences
- General Discussion

Tentative Group Objectives



Brainstorming Meeting : Ideas , possible fields of app.

Contact with Computer Science(CS)

- ML(Machine Learning), Deep-ML, ALOJA-ML (Big Data Platform)
- Feasibility studies, definition and viability of use cases
- To strengthen CS Collaboration

i. <https://www.bsc.es/research-development/research-areas/cognitive-computing/applied-learning-methods>

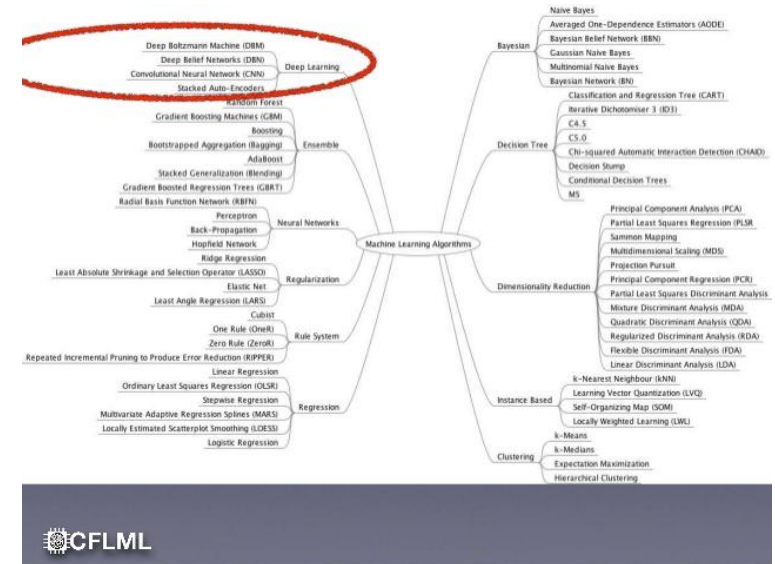
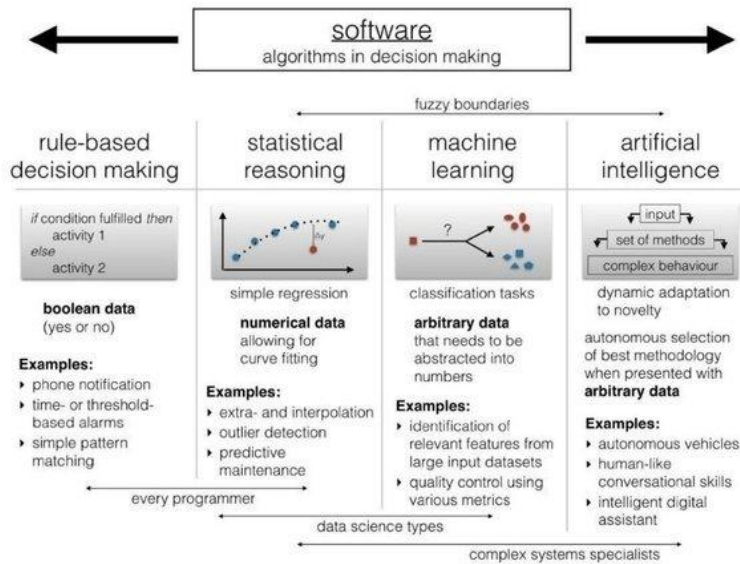
Establish External Collaborations (inc. other BSC dep.)

Roadmap or project strategy (with members)

Preparing a tentative working Plan

- Define roles, duties
- Define Action Plan, Budget, Proposals, Manpower resources

Current Applications



references:

- Machine learning in geosciences and remote sensing

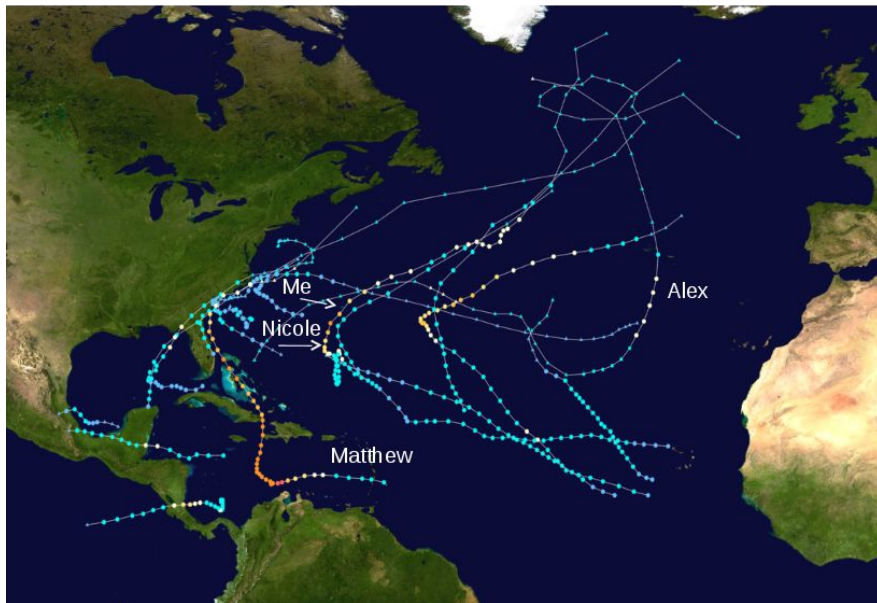
<http://www.sciencedirect.com/science/article/pii/S1674987115000821>

- Niti Mission Report

Machine learning developments

- Classification problems : Data diagnostics, Data discovery
- Empirical ML-based model when no deterministic model exists using existing Data: Genetic Programming
- Code accelerator tool : Where deterministic model exists.
- Identifying Dust Sources
- Wind Speed
- Hurricane : extreme climate conditions: LP Presentation
 - i. https://earth.bsc.es/wiki/lib/exe/fetch.php?media=library:internal:20170112_presentation_website_lpcaron.pptx
- Illustrative Use: Combining with MapGenerator tool ?

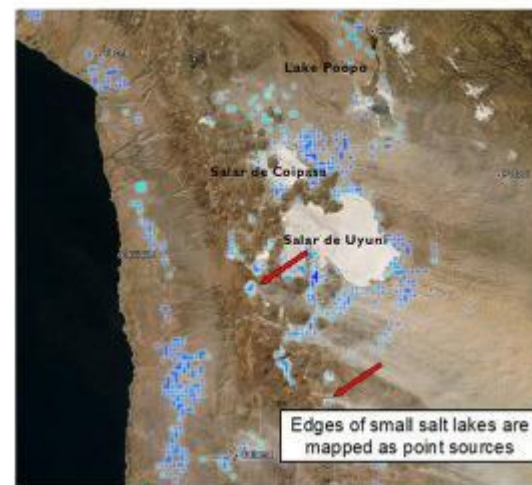
Hurricanes trajectories



Dust Sources : Satellite view



July 18, 2010 MODIS Aqua True Color
South America: Bolivia and Chile



Examples of our ML approach correctly identifying very localized point sources around the edge of salt flats in Bolivia and Chile. Notice the narrow dust plumes originating from precisely the identified source regions that have been highlighted in blue and cyan.



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación



EXCELENCIA
SEVERO
OCHOA

Thank you for your attention !