

Machine learning and physical modelling-Practical Work

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NERSC

<https://github.com/brajard/MAT330-Practical-work>

Presentation of the Practical work

Credits

Data challenge designed by Sophie Giffard-Roisin (University of Colorado, Boulder)

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Tusen takk!!

https:

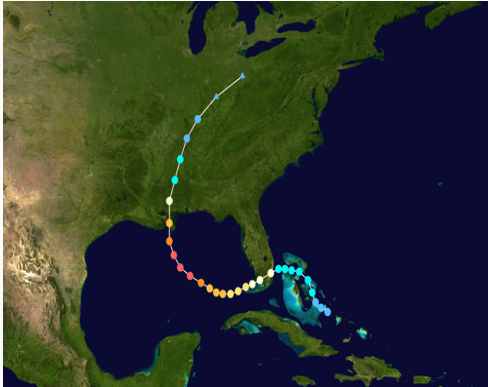
[//github.com/brajard/MAT330-Practical-work](https://github.com/brajard/MAT330-Practical-work)

Hurricane Intensity Forecast



Hurricane Florence, Monday Sept. 10th, 2018

Hurricanes

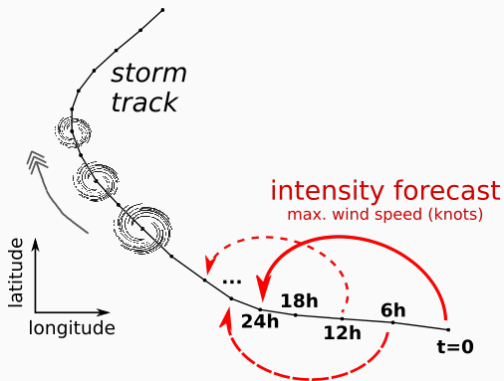


Saffir-Simpson Hurricane Scale		
Category	Wind Speed	
	mph	knots
5	≥ 156	≥ 135
4	131-155	114-134
3	111-130	96-113
2	96-110	84-95
1	74-95	65-83
Non-Hurricane Scale		
Tropical Storm	39-73	34-64
Tropical Depression	0-38	0-33

- Hurricane Katrina, 2005. (1 dot every 6 hours).
- **Tracks** and **Intensity** : Two main goals of the forecast

Your goal!

- Estimating the **24h-forecast intensity** (*wind speed*) of all hurricanes and storms.



Data sources

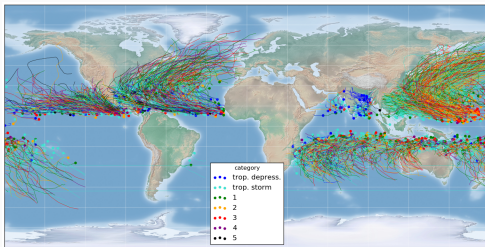
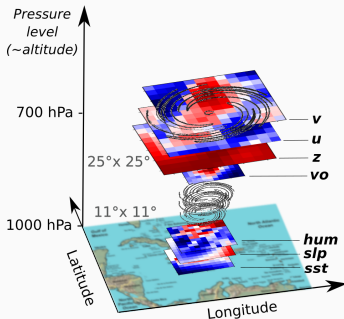
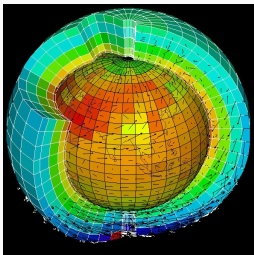


Figure 1: Database: 3000 tropical/extra-tropical storm tracks since 1979.

- 3 000 extra-tropical and tropical storm tracks (NOAA database IBTrACS)
- 90 000 total number of instants (every 6h)
- Public data (download) : 1/4 random storms. On the server: different data + larger data

Data sources

- Reanalysis data:
 - Global atmospheric grids : wind fields, pressure
 - Cropped and centered to the current storm location



Feature data

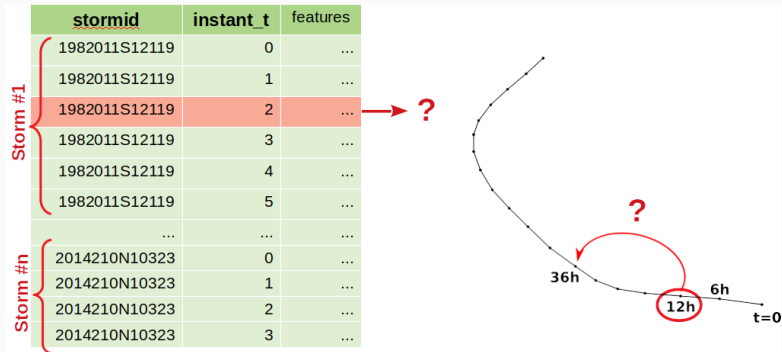
	<u>stormid</u>	instant_t	latitude	longitude	windspeed	hemisphere	Jday_predictor	...
Storm #1	1982011S12119	6 h ↓ 0	-11.8	119.2	25	0	7.54774E-37	...
	1982011S12119	6 h ↓ 1	-12.2	119	25	0	7.54774E-37	...
	1982011S12119	6 h ↓ 2	-12.5	118.6	30	0	7.54774E-37	...
	1982011S12119	... ↓ 3	-12.8	118.3	35	0	7.54774E-37	...
	1982011S12119	4	-12.8	117.6	35	0	7.54774E-37	...
	1982011S12119	5	-12.8	117.2	35	0	7.54774E-37	...
Storm #n
	2014210N10323	0	9.6	-37.1	25	1	0.04677062	...
	2014210N10323	1	9.5	-38.6	30	1	0.04677062	...
	2014210N10323	2	9.5	-40.1	30	1	0.04677062	...
	2014210N10323	3	9.6	-41.5	30	1	0.04677062	...

Feature data

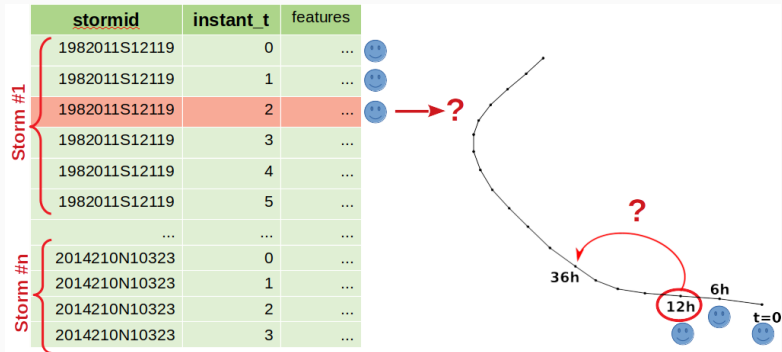
24h forecast
windspeed:

	<u>stormid</u>	<u>instant_t</u>	latitude	longitude	windspeed	hemisphere	Jday_predictor	...	
Storm #1	1982011S12119	6 h ↓ 0	-11.8	119.2	25	0	7.54774E-37	...	→ y_1
	1982011S12119	6 h ↓ 1	-12.2	119	25	0	7.54774E-37	...	→ y_2
	1982011S12119	6 h ↓ 2	-12.5	118.6	30	0	7.54774E-37	...	→ y_3
	1982011S12119	... 3	-12.8	118.3	35	0	7.54774E-37
	1982011S12119	4	-12.8	117.6	35	0	7.54774E-37	...	
	1982011S12119	5	-12.8	117.2	35	0	7.54774E-37	...	
	
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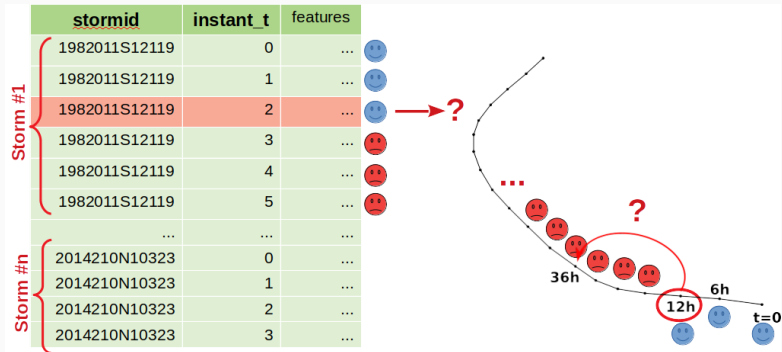
Data from previous steps



Data from previous steps



Data from past steps



Your turn to work!

- `https://github.com/brajard/MAT330-Practical-work : notebook.ipynb` for all informations
- Run the jupyter notebooks from 1. to 6.
- Understand what's going on in the notebooks
- Try to improve the performances

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