Future Extreme Weather: a Data and AI driven approach to Understand Future Coastal Flooding

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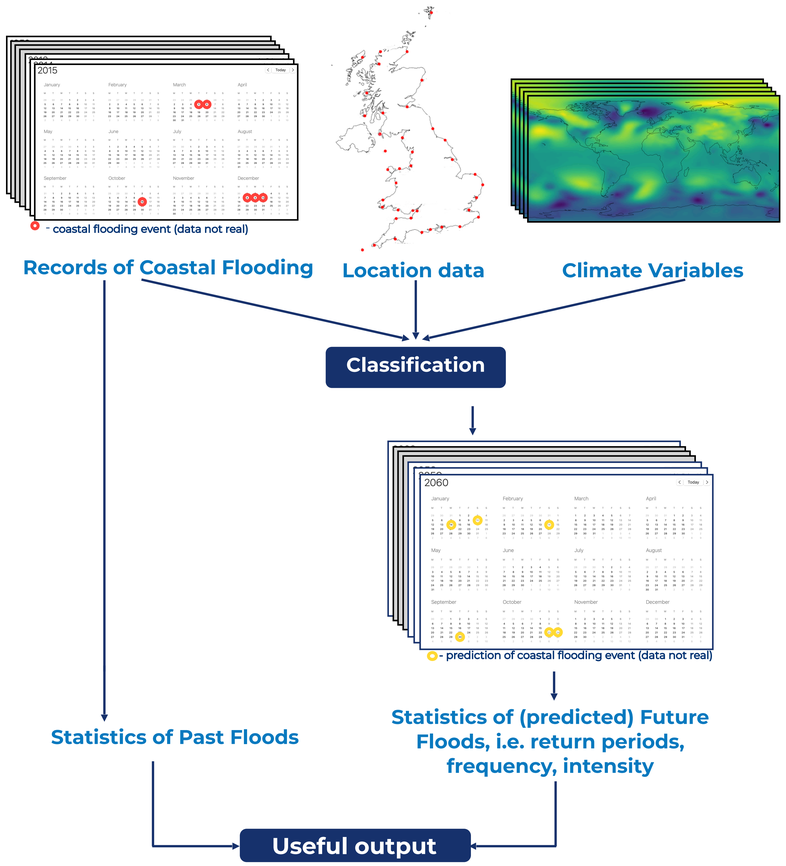
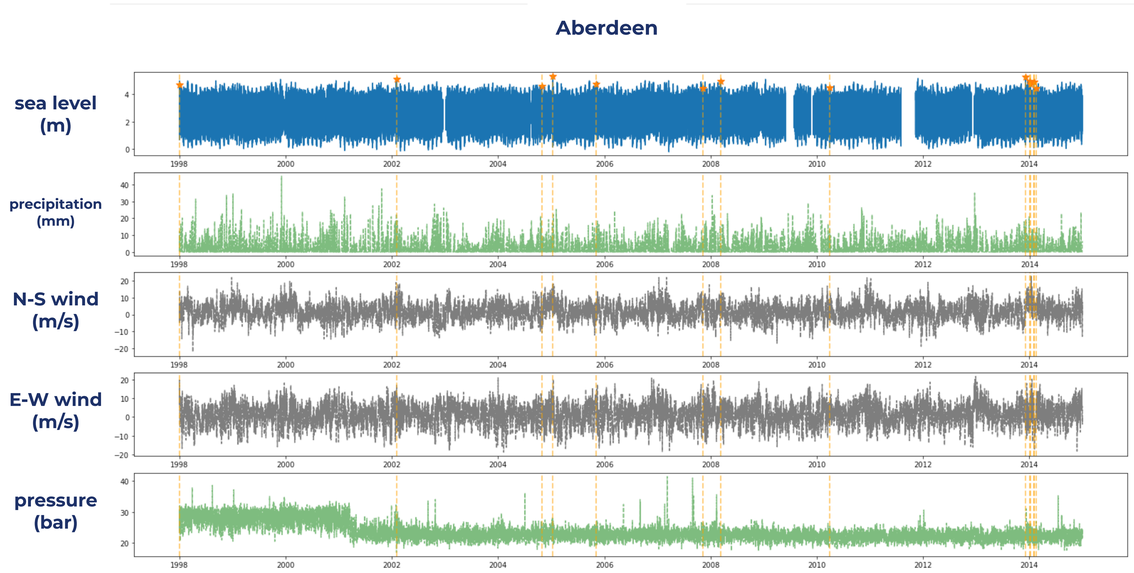
Understanding **future coastal flooding**

- **Goal**: comparing the frequency and intensity of coastal flooding events from the past decades, with ML-generated predictions of flooding events in the future decades.

Approach

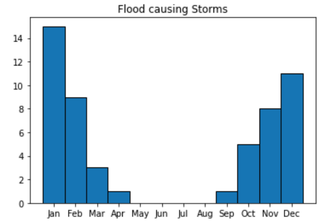
- classification task - opposed to modelling the future time series of sea water level, the task at hand is viewed as a classification task of days with a flood against days without a flood;
- the main problem to solve is to find the region in the multi-dimensional feature space where coastal floods

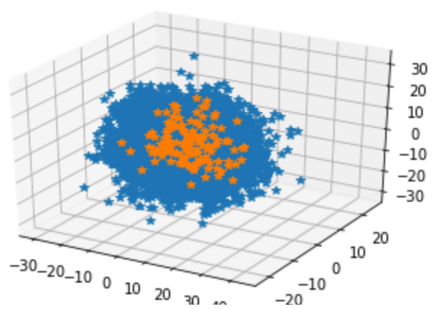




Data:

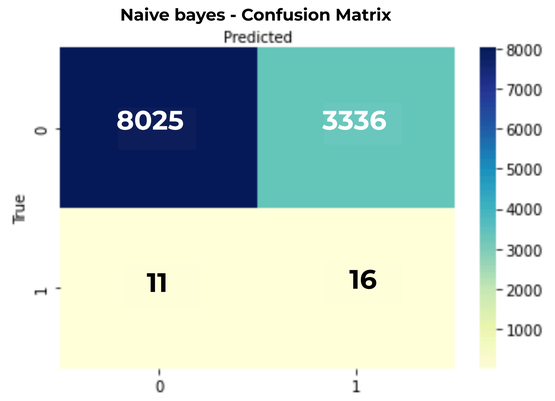
- ERA5 reanalysis data, multiple variables (ps, uas, vas, pr, tas);
- CMIP6 GCM data, multiple variables (ps, uas, vas, pr, tas);
- remote sensing observations (shown in the figure);
- coastal flooding observations from Haigh et al., 2017.





Findings and results:

- high water level does NOT imply a flood - hard to find the flooding cluster;
- increasing the complexity of the algorithm helps with improving the classification task;
- the fully connected NN is the best algorithm tested-to-date;



Future work:

1. Improve the input data for the Classification Model:
   - North Atlantic Oscillation index;
   - Data/proxies regarding the defence systems surrounding the stations;
   - Tide data.
2. Explore models that achieve better approximation of flooding days, and models that can use the data to a better extent (i.e. finding storms).

Looking for any advice or ideas that might be helpful to this!

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