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Visual approach to clustering large-scale meteorological datasets

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Identifying the atmospheric processes which lead to extreme events requires careful generalisation of the meteorological conditions surrounding such events such as sea-level pressure and air temperature. Through the case study of clustering the processes behind extreme rainfall events (annual maximum 1-day rainfall totals) in Great Britain, this presentation shows how visualising the iterative processes used by clustering algorithms can aid in algorithm selection and optimisation. Here two big data datasets, namely the CEH-GEAR (gridded observed rainfall) and NCEP/NCAR Reanalysis datasets are synthesised and clustered using different methods such as k-means, linkage methods and self-organising maps. The performances of these methods are compared and contrasted through analysis of the clusters created at each iteration, highlighting the importance of algorithm selection and understanding. The key findings of this clustering process result in three large-scale meteorological condition types which lead to extreme rainfall in Great Britain as well as a novel approach to comparing clustering mechanisms when using meteorological data.