

PhD program in Statistics

**DSS Statistics Seminar**

**March 10, 2023, 16:00**

<https://uniroma1.zoom.us/j/86881977368?pwd=SWRFcVFjMDZTa0lXZk05TE1zNm5adz09>  
Passcode: 432940

smoothEM: a new approach for  
the simultaneous assessment  
of smooth patterns and spikes

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We consider functional data where an underlying smooth curve is composed not just with errors, but also with irregular spikes that (a) are themselves of interest, and (b) can negatively affect our ability to characterize the underlying curve. We propose an approach that, combining regularized spline smoothing and an Expectation-Maximization algorithm, allows one to both identify spikes and estimate the smooth component. Imposing some assumptions on the error distribution, we prove consistency of EM estimates. Next, we demonstrate the performance of our proposal on finite samples and its robustness to assumptions violations through simulations. Finally, we apply our proposal to data on the annual heatwaves index in the US and on weekly electricity consumption in Ireland. In both datasets, we are able to characterize underlying smooth trends and to pinpoint irregular/extreme behaviors.

Work in collaboration with Huy Dang (Penn State University) and Francesca Chiaromonte (Penn State University and Sant'Anna School of Advanced Studies).



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