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On the uncertainty of real-time predictions of epidemic growths: A COVID-19 case study for China and Italy

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While COVID-19 is rapidly propagating around the globe, the need for providing real-time forecasts of the epidemics pushes fits of dynamical and statistical models to available data beyond their capabilities. Here we focus on statistical predictions of COVID-19 infections performed by fitting asymptotic distributions to actual data. By taking as a case-study the epidemic evolution of total COVID-19 infections in Chinese provinces and Italian regions, we find that predictions are characterized by large uncertainties at the early stages of the epidemic growth. Those uncertainties significantly reduce after the epidemics peak is reached. Differences in the uncertainty of the forecasts at a regional level can be used to highlight the delay in the spread of the virus. Our results warn that long term extrapolation of epidemics counts must be handled with extreme care as they crucially depend not only on the quality of data, but also on the stage of the epidemics, due to the intrinsically non-linear nature of the underlying dynamics. These results suggest that real-time epidemiological projections should include wide uncertainty ranges and urge for the needs of compiling high-quality datasets of infections counts, including asymptomatic patients.

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