

Modeling the COVID-19 epidemic in Germany

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Abstract

The novel corona virus SARS-CoV-2 that causes the disease COVID-19 was first identified in Hubei province, China, in 2019 and has since spread around the globe. Its virulence and the morbidity associated with has caused the WHO to declare this new respiratory disease a pandemic in March 2020.

From a modeling perspective this pandemic poses several challenges. As with most new infectious diseases, many parameters are not particularly well known. Alarming high numbers of known infectious and COVID-19 related deaths led to contact reductions among the population, partly by increased caution, partly mandated by authorities. And the infection often leading to mild, non-specific symptoms - or even no symptoms at all - makes it all but impossible to estimate the ratio of detected cases among all infections.

We shall discuss some of the data available from public domain sources and show how ordinary differential equation models can be used to reproduce these data, generate short term forecasts, and simulate possible further courses of the epidemic for different scenarios. Particular emphasis will be put on the relevance of detection ratios and how they are affected by test strategies and case numbers.