Problem Sheet 1

Robin Elias Piet Schimke Andrea Farfan Aragon

All the programming task are solved using the julia programming language. To reproduce the solution pull https://github.com/relias96/Epidemiologie and following the Instructions in the README.md file. Then run scripts11.jl

A

Given the DGL $\frac{dI}{dT} = \beta SI - \gamma I$ and the assumption $S = N = const.$ can be simplified:

$$\frac{dI}{dT} = \beta NI - \gamma I = I(\beta N - \gamma)$$

Since this DGL is linear in I, the solution of the DGL can be determined as:

$$I(t) = I_0 * e^{\beta N - \gamma}$$

B

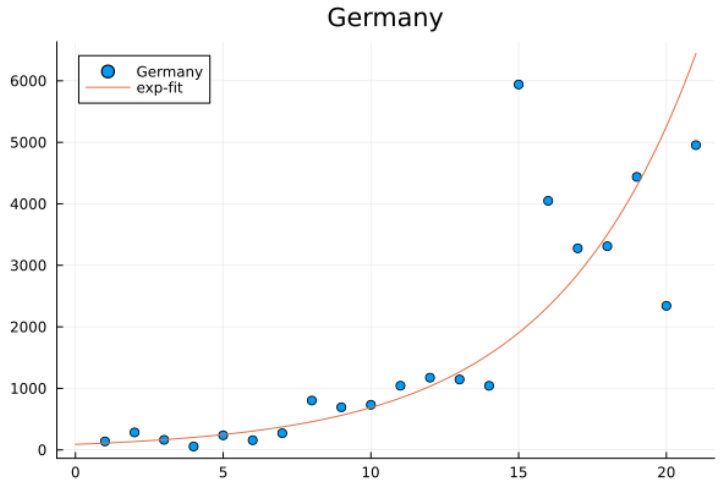

Figure 1: Germany

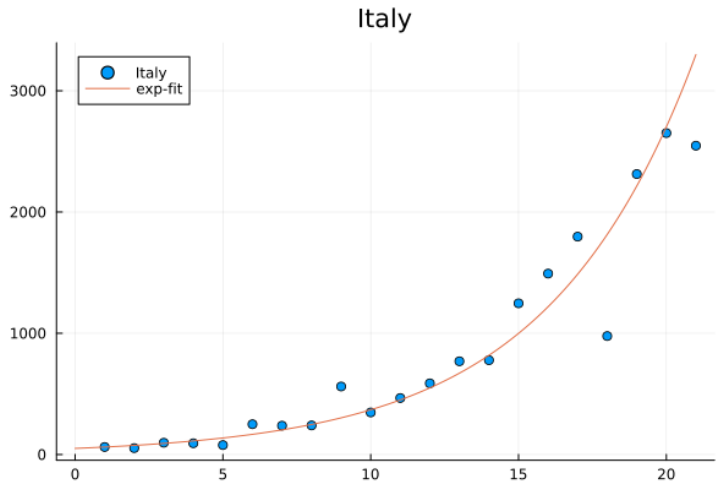

Figure 2: Italy

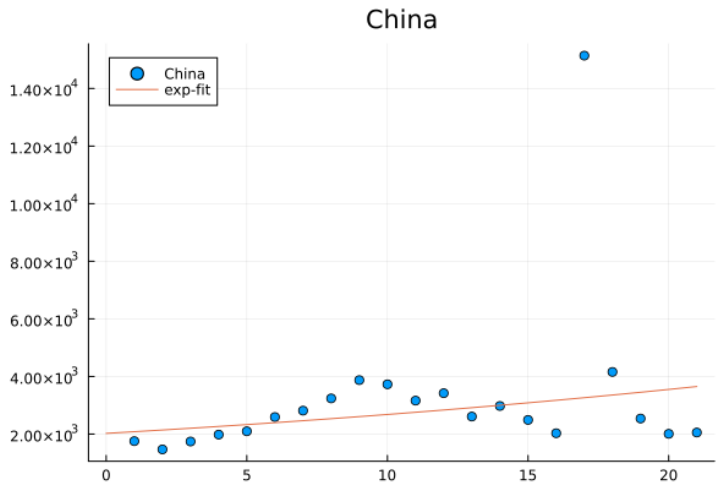

Figure 3: China

Country	λ	R_0
Germany	0.203	2.62
Italy	0.199	2.59
China	0.028	1.224

C

Our Model only fits under the disease-free equilibrium assumtion. For longer timeseries this assumtion is violated and the Model no longer fits the data as well as for short timeseries.

D

Since $R_0 = \frac{\beta N}{\gamma}$ is density dependent in N China should have a higher R_0 Value. However, because our model cannot account for policies such as quarantine, our model is inaccurate in that respect.