

AMSC/MATH 420, Spring 2015 Modeling Epidemics: Team Homework 1b

due Tuesday March 24

Let's continue comparing the basic SI model ($q = r = 0$) with the SIg model ($r = 0$ but $q \geq 0$), as last week looking at the residuals of the rate of new infections predicted by the model $[pS(t)\mathcal{I}(t)]$ versus the new diagnoses per month in your data sets. Test how well you can predict the latter part of your data sets by fitting to the first part of the data, and how much (if at all) including the parameter q improves your prediction. More specifically, for each of your two data sets, perform the following four fits:

1. SI model to all the data
2. SI model to the first 75% of the data (that is, minimize the sum of the squares of the residuals for the first 75% of the data only)
3. SIg model to all the data
4. SIg model to the first 75% of the data

You already did two of these fits last week, but you may be able to improve your methodology this week.

For a set of residuals R_1, R_2, \dots, R_J , recall that the root-mean-square (RMS) error is

$$\sqrt{(R_1^2 + \dots + R_J^2)/J}.$$

For each of your four fits to each of your two data sets, report the parameter values you found, the RMS error for all the residuals, the RMS error for the first 75% of the residuals, and the RMS error for the last 25% of the residuals. Illustrate your results with appropriate graphs, and interpret your results.