

data_analysis

March 5, 2018

1 Tumor growth modeling

This practical session is intended to explore tumor growth data and interpret it using mathematical models. It is divided into three parts (only the first two parts will be covered in this session):
1. Analysis of the data by basic plots
2. Fitting and comparing tumor growth models to the data in order to understand **tumor growth laws**
3. Using the model(s) to **predict** future tumor growth with only a limited number of initial data points

The data provided consists of measurements of tumor volumes from tumors implanted subcutaneously in the back of mice. The cells are from a murine lung cancer cell line (Lewis Lung Carcinoma). The volumes were computed from two one dimensional measures recorded using a caliper (the length L and width w) and using the formula $V = \frac{1}{2}L \times w^2$. Volumes are given in mm^3 as a function of days following injection of the cells (10^6 cells $\simeq 1 \text{ mm}^3$ injected on day 0).

Are you ready to start your exploration?

Good luck on your adventure! :)

2 1. Data analysis

2.0.1 Import modules

```
In [ ]: % matplotlib inline
```

```
In [2]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

Load the data file `data_table.xlsx` as a pandas Dataframe and display it

Extract the time vector

Plot the growth of the first three mice.

Plot all tumor growth on the same panel

Plot the average of the data with error bars as standard deviations

From the individual plots, what tumor growth pattern/equation would you suggest? How could you simply graphically test it? What do you conclude?