

## Assignment 2: Forecasting

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## 1 Problem description

St. Julius Hospital (SJH) performs Caesarean Sections (C-sections) for both scheduled and emergency births. Scheduled C-sections are performed from 9am to 5pm Mondays through Fridays, and emergency C-sections can happen any time. Scheduled C-sections may be postponed or canceled due to emergency C-sections.

SJH allocates three operating rooms (ORs) for C-sections and is considering building a fourth OR since they are struggling to meet their target of performing 98% of scheduled C-sections on time due to the unpredictability of emergency C-sections. There are no staffing or budgetary restrictions at SJH, but if money is spent to build a fourth OR just for C-sections, there will be less money to improve other services.

Your job is to use forecasting to determine if a fourth OR is necessary, and estimate when in the future a fourth OR might be necessary if it is not needed now.

## 2 Data

SJH has provided you with one year's worth of C-section OR usage data (from April 1, 2013 to March 31, 2014) in an Excel file. The data is described in Table 1. You may need to do some cleaning on the dataset, e.g., handle records with missing data, create sub-groups, etc. Use your discretion and do whatever makes sense.

**Data file** StJuliusHospital\_CSection.xlsx

Table 1: St. Julius Hospital C-section data description

Column name	Information
Patient	Patient identifier
Delivery Date	Date of C-section
Day of Week	Day of week of C-section
Delivery Time	Time of actual birth
CS Type	Type of C-section (planned or unplanned)
OR Arrival Time	Time patient arrived in OR
OR Departure Time	Time patient departed OR
Total Patient OR Time	Total time patient was in OR (minutes)

### 3 Questions

Submit your Excel files and a brief PDF report that analyzes your findings and answers the following questions:

1. What data cleaning did you do?
2. Does the cleaned data display seasonality or trends?
3. What forecasting methods are appropriate for this type of data?
4. What is the MAD and MSE of each of your forecasting methods?
5. Do you trust your forecasts? Why or why not?
6. When do you recommend that SJH build a fourth OR, if at all?