

Final Project Assignment

**Last update: 9/21/2011**

**Topic**

One Day Ahead Forecasting for a US Utility

**Objectives**

Develop and sharpen the following skills

- Data analysis
- Statistical modeling
- SAS programming
- Strategic planning
- Teamwork
- Project management
- Reporting
- Documentation
- Presentation

**Background**

A medium-large utility would like to improve their one day ahead load forecasting practice. You are hired to develop statistical models for this utility.

**Team**

4 to 5 students form a group. You will be working with your group members to conduct this project.

Each group need to elect a project manager, whose responsibilities include, but not limited to the following:

- Communicating to the clients
- Planning and scheduling resources
- Monitoring progress
- Reporting daily time spending per person

### Scope of Work

Phase 0            Finish the in-class exercise

*Each student* should turn in a summary of the approach, results, and findings. This serves as the response to the Request For Qualification (RFQ).

#### Submission requirement:

Send the report by 9/16/2011 8am through email to Dr. Tao Hong and Dr. Aric LaBarr.

- Subject title: 2011MSA SMELF Phase 0 RFQ.
- Attachment \*.docx file name: 2011MSA SMELF Phase 0 <First Name> <Last Name>

Phase 1            ETL

Prepare the load and temperature data for further statistical analysis. **Six** years of load and temperature history (**2005 – 2010**) will be provided. You will prepare the 2011 load and temperature for this project, and identify weather forecasting sources to be used.

You can collaborate with other group(s) to achieve this task.

The PM of each group should turn in the group name, PM name, the names of the team members, hourly load and temperature history from 1/1/2011 to 9/15/2011.

#### Submission requirement:

Send the information by 9/23/2011 **5pm** through email to Dr. Tao Hong and Dr. Aric LaBarr.

- Subject title: 2011MSA SMELF Phase 1 ETL
- Write group name, PM name, and the names of the team members in the email body
- Write resource planning in the email body
- Attachment \*.csv file name: 2011MSA SMELF Phase 1 <Group Name>

Phase 2            Model development

This phase includes the following two tasks

#### 2.1        GLM and ARIMA

Report one day ahead ex ante forecasting for the week of **9/26/2011 (9/27 to 10/2)** using

- GLM and/or ARIMA

#### 2.2        Seasonal ARIMA and intervention analysis.

Report one day ahead ex ante forecasting for the week of **10/3/2011 (10/3 to 10/8)** using

- One or more techniques among GLM, ARIMA, SARIMA, intervention analysis
- Your best milestone model if there is any

In each task, prepare a daily log for the models and temperatures used for ex ante forecast, as the forecasting results, hours spent by each group member, judgmental fine tuning for the forecast if there is any, and justification for model change if there is any. Submit the load forecasts and forecasting log by **8am the day before each forecasted day. For instance, the first submission will be by 8am of 9/26, when you will submit the forecasted loads from the 1<sup>st</sup> hour to the 24<sup>th</sup> hour of 9/27. The last day you will submit your forecast is 10/7/2011, when you will provide the forecasted loads for the 24 hours of 10/8/2011. In total, there will be 12 submissions.** The log will be attached as appendix in the final report.

#### Submission requirement:

## 2011 MSA Workshop – Statistical Models for Electric Load Forecasting

The PM of each group should turn in the forecasting log and results by 8am of every day from 9/26/2011 to 10/9/2011 through email to Dr. Tao Hong and Dr. Aric LaBarr.

- Subject title: 2011MSA SMELF Phase 2 MD <Group Name> <MM/DD/YYYY>.
- Attachment \*.csv file name: 2011MSA SMELF Phase 2 load forecast <Group Name> <MM/DD/YYYY>.
- Attachment \*.docx file name: 2011MSA SMELF Phase 2 forecasting log <Group Name> <MM/DD/YYYY>

### Phase 3 Presentation and documentation

Each group will make a final presentation and submit a written report documenting the milestone models, summarizing the findings, recommended models, forecasting results, and the time spending per person per phase/task.

Document all the milestone models including GLM, ARIMA, seasonal ARIMA, intervention analysis based model, and your best models used in each forecasting period. For each milestone model, summarize

- ex ante forecasting accuracy statistics for 9/27/2011 to 10/8/2011.
- ex post forecasting accuracy statistics for 9/27/2011 to 10/8/2011.
- ex post forecasting accuracy statistics for 11/16/2010 – 2/15/2011 and 6/1/2011 – 8/31/2011

#### Submission requirement:

The PM of each group should turn in the presentation slides and final report by 8am of 10/24/2011 through email to Dr. Tao Hong and Dr. Aric LaBarr.

- Subject title: 2011MSA SMELF Phase 3 DP <Group Name>
- Attachment \*.docx file name: 2011MSA SMELF Phase 3 final report <Group Name>
- Attachment \*.pptx file name: 2011MSA SMELF Phase 3 presentation <Group Name>

### Important Dates

Response to RFQ due	9/16/2011
Group info, resource planning, ETL report due	9/23/2011
Daily submission of load forecasts and logs	9/26/2011 – 10/7/2011
Final report and presentation slides due	10/24/2011
Final presentation	TBD

**Grading (1000' total)**

Phase 0 (100')

Ex. 1: 30'

Ex. 2: 40'

Ex. 3: 30'. Individual Score =  $\max \{30-r, 0\}$ <sup>[1]</sup>

Team score = average of the individual scores

Phase 1 (100')

Group info: 20'

Resource planning: 30'

Data: 50'

Phase 2 (200' per task)

Forecast: 10' per day. Team Score =  $\max \{10-2r, 0\}$ <sup>[1]</sup>

Log: 10' per day

On time bonus: 40' per task

Phase 3 (300')

Report: 100'

Presentation slides: 100'

Presentation: 100'

On time bonus for the project: 100'

Late submission of any phase/task will be disregarded.

[1]  $r$  is your rank among your peers. Fractional ranking method (1, 2.5, 2.5, 4) will be used to determine your rank.