Technical Analysis Report

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Date: *May 18, 2025*

Abstract

This document demonstrates a workflow for generating reports that combine technical writing with programmatically generated figures and tables. This template is designed for scientific or technical reports that require data visualization and analysis.

Introduction

This document demonstrates an automated workflow for creating technical reports with embedded figures and tables generated from data. It combines the power of programming for data analysis with document preparation.

The workflow consists of:

- Python scripts that process data and generate figures
- Document template that includes the generated figures
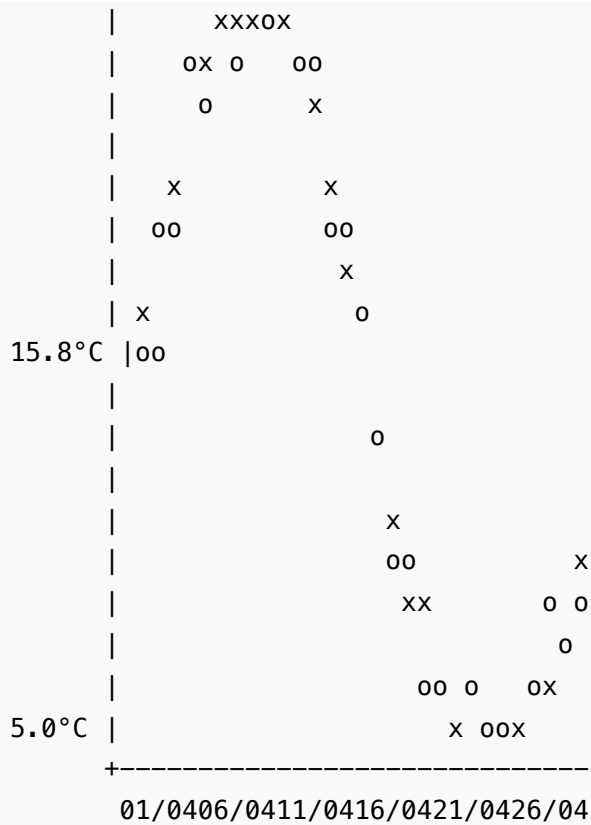- Shell script that automates the process

Time Series Analysis

Figure 1 shows a comparison between observed temperature data and model predictions over a one-month period. The model generally follows the seasonal pattern, but there are some discrepancies, particularly during extreme temperature events.

```
Temperature Time Series: Model vs Observations
========================================================

26.5°C |        o o
       |           xo
```

```
        |       xxxox
        |     ox o    oo
        |       o        x
        |
        |    x              x
        |   oo            oo
        |                 x
        | x                  o
15.8°C |oo
        |
        |                  o
        |
        |                 x
        |                oo           x
        |                 xx        o o
        |                          o
        |              oo o    ox
 5.0°C |                    x oox
        +----------------------------
         01/0406/0411/0416/0421/0426/04

Legend: o = Observations, x = Model
```

Spatial Error Analysis

The spatial distribution of errors between observations and model predictions is shown in Figure 2. Areas with positive values indicate where the model underestimates observations, while negative values show overestimation.

```
Spatial Error Distribution
============================================================

.. xXX###########XXx .
. xXX#############XXx
  xX###############Xx
xX######XXXXX#######X
XX#####Xx ... xX#####X
X#####X .ooooo. X####
####X .o+++++o. X###
####x.o+++++++o.x###
###X o+++++++++o X##
###X.o++++o++++o.X##
###X.o+++o o+++o.X##
```

```
###X.o++++o++++o.X##
###X o++++++++++o X##
####x.o+++++++o.x###
####X .o+++++o. X###
X####X .ooooo. X####
XX#####Xx ... xX####X
xX######XXXXX######X
 xX###############Xx
. xXX############XXx


Legend:
  + o . : Positive errors (observations > model)
  # X x : Negative errors (observations < model)
  Range: -0.79 to 1.49
```

Regional Performance Statistics

Table 1 summarizes the model performance metrics across different regions. The metrics include Root Mean Square Error (RMSE), correlation coefficient, bias, and standard deviation.

Region	RMSE	Correlation	Bias	Std Dev
North	3.56	0.51	-0.9	1.06
South	3.95	0.8	1.57	0.72
East	2.69	0.51	-1.13	1.76
West	1.11	0.59	0.6	1.86
Central	1.88	0.77	1.24	0.52

Conclusion

This document demonstrated a workflow for generating technical reports with embedded figures and tables. This approach allows for:

- Reproducible research and analysis
- Consistent formatting and styling
- Automated document generation
- Version control of both code and document

By combining programming for data analysis with document preparation, you can create professional-quality reports efficiently.