Verif 1.0

A python package for forecast verification

Thomas Nipen (Norwegian Meteorological Institute)
David Siuta and Roland Stull (UBC)
Improving products using verification

Verification

Identify problems

Develop solutions

Adopt
Verif: A forecast verification package

- Open-source command-line tool in python
- Forecast and observations for point locations
- 80 metrics/diagrams and 60 command-line flags
Verif: A forecast verification package

- Open-source command-line tool in python
- Forecast and observations for point locations
- 80 metrics/diagrams and 60 command-line flags

```
[~]$ verif input*.txt -m mae [options]
```

- input1.txt
  - Obs/forecasts
  - Dates
  - Lead times
  - Locations (lat, lon)

- input2.txt

- input3.txt

![Graph showing MAE (°C) vs Lead time (h)](image)
Verif: A forecast verification package

- Open-source command-line tool in python
- Forecast and observations for point locations
- 80 metrics/diagrams and 60 command-line flags
- Text or NetCDF format

<table>
<thead>
<tr>
<th>date</th>
<th>leadtime</th>
<th>lat</th>
<th>lon</th>
<th>elev</th>
<th>obs</th>
<th>fcst</th>
</tr>
</thead>
<tbody>
<tr>
<td>20150101</td>
<td>0</td>
<td>60.0</td>
<td>10.7</td>
<td>84</td>
<td>3.2</td>
<td>4.2</td>
</tr>
<tr>
<td>20150101</td>
<td>1</td>
<td>60.0</td>
<td>10.7</td>
<td>84</td>
<td>5.7</td>
<td>5.5</td>
</tr>
<tr>
<td>20150101</td>
<td>2</td>
<td>60.0</td>
<td>10.7</td>
<td>84</td>
<td>2.4</td>
<td>3.7</td>
</tr>
<tr>
<td>20150101</td>
<td>3</td>
<td>60.0</td>
<td>10.7</td>
<td>84</td>
<td>1.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>20150101</td>
<td>4</td>
<td>60.0</td>
<td>10.7</td>
<td>84</td>
<td>8.4</td>
<td>9.5</td>
</tr>
<tr>
<td>20150101</td>
<td>5</td>
<td>60.0</td>
<td>10.7</td>
<td>84</td>
<td>7.6</td>
<td>10.2</td>
</tr>
</tbody>
</table>
Scores across different dimension

![Graph showing temperature changes over dates from Jan 2014 to Jan 2016. The x-axis represents dates, and the y-axis represents MAE (°C). The graph displays temperature fluctuations with MAE values ranging from 0 to 6.]

![Map showing geographic distribution with color-coded MAE values. The map covers the Nortwest area with latitude lines at 60°N, 65°N, and 70°N, and longitude lines from 5°E to 25°E. The color bar indicates MAE values from 0.0 to 5.0.]
Meteograms for a specific date and location
Why so many metrics?

- A single metric does not give complete picture
- Diagnosing problems requires flexibility

**-m spreadskill**

![Spreadskill Diagram](image)

**-m qq**

![Q-Q Plot Diagram](image)

**-m discrimination**

![Discrimination Diagram](image)

**-m sedi**

![Sedi Diagram](image)

**-m performance**

![Performance Diagram](image)

**-m taylor**

![Taylor Diagram](image)

**-m cond**

![Cond Diagram](image)

**-m impact**

![Impact Diagram](image)

**-m economicvalue**

![Economic Value Diagram](image)

**-m ets**

![ETS Diagram](image)
Why so many metrics?

- A single metric does not give a complete picture
- Diagnosing problems requires flexibility
- End-users have different needs

**Bergen**
Hordaland (Norway), elevation 57m

- List
- Graph
- Precip. Map

**Rain-window**

![Graph showing precipitation expected next 90 minutes](image)
Probabilistic evaluation

Probabilistic forecasts
E.g. CDF for 0.2 and 0.5 mm
Other features

- Customizing plots
  - Colors
  - Font sizes
  - Axis labels

- Exporting to file
  - Image files
  - Text files

- Adding new metrics/diagrams
Summary

Check out: github.com/WFRT/verif

Contact info: thomasn@met.no