Data Processing School :: Exercise 53

Source directory	/data/lofarschool/data/exercise 53
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Context

This script demonstrates one of the most general PyDAL tools, “baseline.py”. It would be useful for seeing the quality of your visibility data and understanding how an interferometer sees the sky.

Prerequisite

A little knowledge of shell and python programming (or at least a curiosity to learn).

Description

In this exercise you will run a python script that uses the PyDAL to read a Measurement Set into python. The script is called “baseline.py” because it plots correlated data on a single baseline. Options in the script let you choose the baseline to plot, whether to plot data from a single channel or a single time (i.e., a spectrum), the part of your data to plot (amplitude or phase), and much more.

Files & Directories

1. `baselineplot.png` – An example plot from “baseline.py” using default data showing the visibility amplitude on baseline 1-11.
2. `baseline.py` – Python script to plot visibility data from a Measurement Set
3. `L4086_sSB10.MS` – Measurement set of a long (~80 hour) LBA observation. The phase center is toward the north celestial pole.
4. `run_script.sh` – bash script to run Python script

Step-by-step instructions

1) Run “run_script.sh” and examine the output plot. Use the plot to answer the following questions:

a) Assume that the visibilities are completely determined by the motion of Cas A and Cyg A through the sky. What causes the slowest variations in the visibility amplitude in the plot?

b) There are very fast (~hour-long) changes to the amplitude within each day. As with the slow changes, these are caused by the motion of Cas A and Cyg A through the sky. In this case the sensitivity pattern is unique to this baseline. What does this pattern look like when projected on the sky?

2) Run the python script alone to answer the following questions. Use this syntax to plot the amplitude of baseline 1-3 for the first channel. For this, you may have to adjust your PYTHONPATH variable in the shell, as is done in the script. You can also edit the specific line in the bash script, and

simply run the script.

```
   python baseline.py /lifs012/simulations/L4086_sSB10.MS 1 3 0 channel 0
```

a) How does this pattern look different from the first example, which used baseline 1-11?

b) How is the sensitivity pattern of baseline 1-3 different from 1-11? Why?

3) Run the python script alone to answer the following questions. Use this syntax to plot the amplitude of baseline 1-3 for the first channel showing xx and yy correlations in different colors:

```
   python baseline.py /lifs012/simulations/L4086_sSB10.MS 1 3 0 channel 0 a
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```

a) The plot shows the amplitude of the xx and yy visiblities on baseline 1-3. The baseline lengths for xx and yy correlations are exactly the same. Why are the visibilities different?

Example outputs

See the png in the exercise directory.

Outstanding Problems

Corrected - ER