BBS

MS^3 Meeting

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Features

- Instrument model components
  - Bandpass*
  - (Directional) gain (G/J - Jones)
  - LBA dipole beam*
- Source models
  - Point source
  - Elliptical Gaussian*
- Parameter modeling
  - N-th order polynomials in (f,t)

* *Pending validation*

Performance

- Model fitting is the main factor
  - Model evaluation (incl. partial derivatives)
  - Constructing (modified) LSQ problem
  - Solve LSQ problem
- Typical scenario
  - Full J-Jones matrix
  - Single solution per time slot per sub-band
  - 2 directions (CasA, CygA), 10 iterations

Performance (2)

- Solving LSQ problem
  - 16 x 4 x 2 x 2 = 256 parameters ~ 50 ms / it
  - 512 parameters ~ 388 ms / it
  - 700 parameters ~ **1 s / it**

Performance (3)

- For a single sub-band (16 stations)
  - 30 s / 0.76 kHz / 120 baselines
  - Time per iteration ~ 700 ms
    - When only solving for G-Jones ~ 190 ms
- For a single sub-band (33 stations)
  - 1 s / 0.76 kHz / 528 baselines
  - Time per iteration ~ 4.3 s
    - When only solving for G-Jones ~ 1.1 s

Performance (4)

- For a single sub-band (33 stations)
  - 7.7 s / 33.75 kHz / 528 baselines
  - Time per iteration ~ 875 ms
    - When only solving for G-Jones ~ 200 ms

Future work

- Support for computing solutions using data from multiple nodes
- Integration into off-line pipeline
- Additional (station) beam models
- Additional source models (shapelets)?
- Ionosphere model
- **Improve performance**

Challenges / Issues

- Performance
- Concrete calibration strategy
  - Which operations need to be performed?
  - With which settings?
    - Full resolution / integrated (by which factor)?
    - Model structure (beam/ionosphere/...)?
    - Number of sources
    - Solution domain size
    - Number of parameters
    - Number of iterations

Challenges / Issues (2)

- Detailed algorithm descriptions and / or mathematical models
  - Ionosphere
  - Beam
  - Analytical solutions?
- Other requirements
  - Different integration times for different baselines?
  - ...