

## GammaLib - Action #2466

### Computation time of diffuse map models

04/27/2018 02:38 PM - Cardenzana Josh

<b>Status:</b>	Closed	<b>Start date:</b>	04/27/2018
<b>Priority:</b>	Normal	<b>Due date:</b>	
<b>Assigned To:</b>	Cardenzana Josh	<b>% Done:</b>	100%
<b>Category:</b>		<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>	1.6.0		

#### Description

This concerns the computation of a given spatial diffuse model convolution with the IRFs in `cta_irf_diffuse_kern_phi`. Two changes could reduce the amount of time spent in the relevant methods:

- Caching variables (specifically `GVector` and `GPhoton` objects) in `cta_irf_diffuse_kern_theta` and `cta_irf_diffuse_kern_phi` in `GCTAResponse_helpers` in order to reduce the time used for allocating/deallocating memory. These objects are allocated/deleted ~25 times for each bin evaluated in `ctmodel` and profiling suggests caching would noticeably reduce the computation time.
- `GModelSpatialDiffuseCube::cube_intensity` involves an evaluation of the underlying cube at two energy values, but at the same sky position. This makes two calls to `GSkyMap::dir2pix` which is computationally expensive. Caching the pixel value would result in half as many calls to this function.

#### History

##### #1 - 04/27/2018 03:35 PM - Cardenzana Josh

- Status changed from *New* to *Pull request*

- % Done changed from 0 to 100

The above changes have been made. The result is about a factor of 2 reduction in the tests I ran using `ctmodel` and the diffuse IEM background model. Affected files:

- `GSkyMap (.hpp & .cpp)`
- `GCTAResponse_helpers (.hpp & .cpp)`

Pull branch:

GammaLib: `joshcardenzana/gammlib/2466-diffuse_map_speed`

##### #2 - 04/27/2018 03:54 PM - Cardenzana Josh

- Status changed from *Pull request* to *In Progress*

- % Done changed from 100 to 90

I mistakenly branched this change from my fix on issue #2463. I'll fix that before the pull.

##### #3 - 04/27/2018 04:16 PM - Cardenzana Josh

This branch now stands on its own. The computation times are unaffected.

Pull branch:

GammaLib: `joshcardenzana/gammlib/2466-diffuse_map_speed`

**#4 - 04/27/2018 04:17 PM - Cardenzana Josh**

- Status changed from *In Progress* to *Pull request*

- % Done changed from 90 to 100

**#5 - 06/05/2018 03:12 PM - Knödseder Jürgen**

Improved GSkyMap::dir2pix caching by introducing a specific last sky direction for the caching.

**#6 - 06/05/2018 03:58 PM - Knödseder Jürgen**

- Status changed from *Pull request* to *Closed*

- Target version set to 1.6.0

Merged into devel.

**#7 - 06/06/2018 11:34 AM - Knödseder Jürgen**

- Status changed from *Closed* to *Feedback*

It turned out that the caching was not OMP thread safe. Furthermore, it is more universal to do the caching at the level of the GWcs::pix2dir() and GWcs::dir2pix() methods so that all clients can benefit from that.

So I move the caching implementation there and tried to make the core OMP thread safe. Still need to check whether any thread conflicts come up.

**#8 - 07/20/2018 11:41 PM - Knödseder Jürgen**

- Status changed from *Feedback* to *Closed*