

GammaLib - Feature #3328

Implement numerical integration over vectors of functions

09/03/2020 05:21 PM - Knödlseider Jürgen

Status:	Closed	Start date:	09/03/2020
Priority:	Normal	Due date:	
Assigned To:	Knödlseider Jürgen	% Done:	100%
Category:		Estimated time:	0.00 hour
Target version:	2.0.0		
Description			
<p>To improve the efficiency of the computations it should be possible to apply numerical integration to vectors of functions, returning hence the a vector of integrals in a single method call. This allows for example to integrate in one shot a function and its derivatives.</p> <p>For this purpose a new class</p> <pre>class GFunctions { public: // Constructors and destructors GFunction(void); GFunction(const GFunction& function); virtual ~GFunction(void); // Operators GFunction& operator=(const GFunction& function); // Methods virtual GVector eval(const double& x) = 0; }</pre> <p>needs to be introduced which an eval() method that returns a vector of values for a given argument x.</p> <p>Methods</p> <pre>explicit GIntegral(GFunctions* kernel); void kernel(GFunctions* kernel); const GFunctions* kernel(void) const; GVector trapzd(const double& a, const double& b, const int& n, GVector result); GVector romberg_vector(const double& a, const double& b, const int& order);</pre> <p>need to be added to the GIntegral class to support these vectors.</p>			
Related issues:			
Related to GammaLib - Action # 3203: Implement spatial IRF integration method...		Closed	04/11/2020

History

#1 - 09/03/2020 05:21 PM - Knödlseider Jürgen

- Related to Action #3203: Implement spatial IRF integration methods that return IRF values for all events added

#2 - 09/04/2020 03:46 PM - Knödlseider Jürgen

- Status changed from New to In Progress

- % Done changed from 0 to 10

I implemented the GFunctions class and added a dedicated unit test.

#3 - 09/04/2020 11:01 PM - Knödseder Jürgen

- % Done changed from 10 to 90

I replaced GVector by GNdarray to have a more general definition of a set of functions in GFunctions.

For integration of a set of functions I implemented the GIntegrals class. Only the GIntegrals::romberg methods were implemented since the other integration methods are actually nowhere used. They can be added later if really needed.

#4 - 09/08/2020 09:15 AM - Knödseder Jürgen

- Status changed from In Progress to Closed

- % Done changed from 90 to 100

Merged into devel.