TwoMassCnvrt

RichardJ.Mathar

Generated by Doxygen 1.8.2

Thu May 23 2013 21:38:46

Contents

1 Class Index

1.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

TwoMassCnvrt   **2**

2 File Index

2.1 File List

Here is a list of all files with brief descriptions:

TwoMassCnvrt/config.h   **6**

TwoMassCnvrt/TwoMassCnvrt.cxx

    TwoMassCnvrt extracts star positions and magnitudes from the 2MASS catalogue (on the
user's file system) and generates an ASCII format of the stars distributed over the pixels in
the field of view in the catalogue style of skymaker   **7**

TwoMassCnvrt/TwoMassCnvrt.h   **8**

3 Class Documentation

3.1 TwoMassCnvrt Class Reference

`#include <TwoMassCnvrt.h>`

Public Member Functions

- TwoMassCnvrt (int detsiz, float pixsc, const std::string catdir)

  Constructor.
- void skymakeList (double ra, double decl, float maglim, char band, float q, const bool geirs) const

  Create a Skymaker list of the field-of view on stdout.
- void wcs (double ra, double decl) const

  Print the associated WCS keywords to the standard output.
- void spdRange (double decl, int spd[2]) const

  Convert postition into an index of the catalog.
- float mag2mag (float magI, int magidx, float q=1.) const

  Convert a H, J or Ks magnitude to a V magnitude.
- std::string alpha2hex (double alpha) const

  Convert a reight ascension (radians) into the standard HH:MM:SS format.
- std::string deg2hex (double delta) const

  Convert a declination (radians) into the standard DD:MM:SS format.

Static Public Member Functions

- static double hex2deg (const std::string &hexstr, bool isdeg)

  Convert a sedecimal-String to degrees.

Public Attributes

- int detsize

  2-sided field-of-viewk, expressed as the edge of the full detector in units of pixels.
- float px

  Pixel scale in the FITS image [rad/px].
- std::string catDir

  Directory of 2MASS catalog with the xxx/t∗.cat ∗ files.

Protected Member Functions

- bool tanProj (double ra, double decl, double radec[2], int xy[2]) const

  Convert a sky coordinate (pair) to a pixel coordinate (pair) in tangential projection.

3.1.1 Constructor & Destructor Documentation

3.1.1.1 TwoMassCnvrt::TwoMassCnvrt (int *detsiz,* float *pixsc,* const std::string *catdir*)

Constructor.

Parameters

in	*detsiz*	
in	*pixsc*	
in	*catdir*	

Author

> Richard J. Mathar

Since

> 2012-11-29

3.1.2 Member Function Documentation

3.1.2.1 void TwoMassCnvrt::skymakeList (double *ra,* double *decl,* float *maglim,* char *band,* float *q,* const bool *geirs*) const

Create a Skymaker list of the field-of view on stdout.

Parameters

in	*ra*	Right ascension in the center of the chip [rad]
in	*decl*	Declination in the center of the chip [rad]
in	*maglim*	The minimum limiting magnitude. Stars that are fainter are not added to the list of the output.
in	*band*	One of "J", "H" or "K"
in	*q*	quantum efficiency in the range 0 to 1.0.
in	*geirs*	If true, generate GEIRS catalog, not skymaker catalog.

Author

> Richard J. Mathar

Since

> 2012-11-29
> 2013-02-13 with additional geirs parameter

3.1.2.2 void TwoMassCnvrt::wcs (double *ra,* double *decl*) const

Print the associated WCS keywords to the standard output.

The FITS image that is created by this invocation of the Skymaker is oriented with North up and East to the left. There is currently no framework to create a more general sky rotation implied by some instrument specific optics.

In practise this means that the command line supports specification of the FITS images by ecliptic coordinates, but not by some mix of altitudes, azimuths or hour angles and geographic latitudes and similar sets of parameters.

Parameters

in	*ra*	Right ascension in the center of the detector [rad]
in	*decl*	Declination in the center of the detector [rad]

3.1.2.3 void TwoMassCnvrt::spdRange (double *decl,* int *spd[2]*) const

Convert postition into an index of the catalog.

Parameters

in	*decl*	The pointing (declination) in the middle of the fov [rad]. The valid range is -1.-57..1.57.
out	*spd*	The lower and upper limit (exclusive) of the directory name. Both in the range 0 to 180.

Since

> 2012-12-10

3.1.2.4 float TwoMassCnvrt::mag2mag (float *magI,* int *magidx,* float *q =* 1.) const

Convert a H, J or Ks magnitude to a V magnitude.

This is only intended to be used for mimicking magnitudes for input to skymaker. The conversion computes a number of photons for the specified magnitude in the infrared and takes this number as the number of photons in the visible to obtain an "equivalent" magnitude in the visible.

Parameters

in	magI	The magnitude in the infrared band.
in	magidx	The integer value of the band. 0 for J, 1 for H and 2 for K.
in	q	A flux reducing quantum efficiency in the range 0 to 1.0.

Returns

> magI converted to the visible.

Since

> 2012-12-22

3.1.2.5 string TwoMassCnvrt::alpha2hex (double *alpha*) const

Convert a reight ascension (radians) into the standard HH:MM:SS format.

Parameters

in	alpha	The angle in radians

Returns

> A string HH:MM:ss.ss equivalent to this angle.

3.1.2.6 string TwoMassCnvrt::deg2hex (double *delta*) const

Convert a declination (radians) into the standard DD:MM:SS format.

Parameters

in	delta	The angle in radians

Returns

> A signed string +-DD:MM:ss.ss equivalent to this angle.

3.1.2.7 double TwoMassCnvrt::hex2deg (const std::string & *hexstr,* bool *isdeg*) `[static]`

Convert a sedecimal-String to degrees.

Parameters

in	hexstr	A string with optional sign, integer number, colon, integer number, colon and integer or floating point number.

in		*isdeg*	If true, assume that the string is in DD:MM:SS.ss format. If false the string is in HH:MM:SS.ss format. This implies an additional factor 15 to move on to degrees. If the string contains a sign (plus or minus), this parameter is ignored and the function assumes degrees.

Returns

The value in degrees.

Since

2012-11-13

3.1.2.8   bool TwoMassCnvrt::tanProj (double *ra,* double *decl,* double *radec[2],* int *xy[2]*) const `[protected]`

Convert a sky coordinate (pair) to a pixel coordinate (pair) in tangential projection.

Parameters

in	*ra*	RA in the middle of the plate [rad]
in	*decl*	Declination in the middle of the plate [rad]
in	*radec*	The ra and dec position of the object on the sky [rads]
out	*xy*	Set to the FITS image coordinates if the return value is true.

Returns

true If the coordinate falls into the rectangular window of the detector.

3.1.3   Member Data Documentation

3.1.3.1   int TwoMassCnvrt::detsize

2-sided field-of-viewk, expressed as the edge of the full detector in units of pixels.

We only consider quadratic detectors. For a single Hawii2 chip, this is 2048, for example.

3.1.3.2   float TwoMassCnvrt::px

Pixel scale in the FITS image [rad/px].

Obtained from the [arcsec/px] number by multiplication with pi/(180∗3600).

3.1.3.3   std::string TwoMassCnvrt::catDir

Directory of 2MASS catalog with the xxx/t∗.cat ∗ files.

For example "tmc1" indicates that tmc1/000/t∗.cat up to tmc1/189/t∗.cat are the files that have been processed by the tmcat expander.

The documentation for this class was generated from the following files:

- TwoMassCnvrt/TwoMassCnvrt.h
- TwoMassCnvrt/TwoMassCnvrt.cxx

4   File Documentation

4.1 TwoMassCnvrt/config.h File Reference

Macros

- #define HAVE_FCNTL_H
- #define HAVE_INTTYPES_H
- #define HAVE_MEMORY_H
- #define HAVE_MKDIR
- #define HAVE_STDBOOL_H
- #define HAVE_STDINT_H
- #define HAVE_STDLIB_H
- #define HAVE_STRCHR
- #define HAVE_STRINGS_H
- #define HAVE_STRING_H
- #define HAVE_SYS_STAT_H
- #define HAVE_SYS_TYPES_H
- #define HAVE_UNISTD_H
- #define PACKAGE_BUGREPORT
- #define PACKAGE_NAME
- #define PACKAGE_STRING
- #define PACKAGE_TARNAME
- #define PACKAGE_URL
- #define PACKAGE_VERSION
- #define STDC_HEADERS

4.1.1 Macro Definition Documentation

4.1.1.1 #define HAVE_FCNTL_H

4.1.1.2 #define HAVE_INTTYPES_H

4.1.1.3 #define HAVE_MEMORY_H

4.1.1.4 #define HAVE_MKDIR

4.1.1.5 #define HAVE_STDBOOL_H

4.1.1.6 #define HAVE_STDINT_H

4.1.1.7 #define HAVE_STDLIB_H

4.1.1.8 #define HAVE_STRCHR

4.1.1.9 #define HAVE_STRINGS_H

4.1.1.10 #define HAVE_STRING_H

4.1.1.11 #define HAVE_SYS_STAT_H

4.1.1.12 #define HAVE_SYS_TYPES_H

4.1.1.13 #define HAVE_UNISTD_H

4.1.1.14 #define PACKAGE_BUGREPORT

4.1.1.15 #define PACKAGE_NAME

4.1.1.16 #define PACKAGE_STRING

4.1.1.17 #define PACKAGE_TARNAME

4.1.1.18 #define PACKAGE_URL

4.1.1.19 #define PACKAGE_VERSION

4.1.1.20 #define STDC_HEADERS

4.2 TwoMassCnvrt/TwoMassCnvrt.cxx File Reference

TwoMassCnvrt extracts star positions and magnitudes from the 2MASS catalogue (on the user's file system) and generates an ASCII format of the stars distributed over the pixels in the field of view in the catalogue style of skymaker.

Functions

- void usage (char ∗argv0)

  Emit a short usage reminder.
- int main (int argc, char ∗argv[])

  The C++ program TwoMassCnvrt converts portions of the 2MASS catalog to a Skymaker's list file.

4.2.1 Detailed Description

TwoMassCnvrt extracts star positions and magnitudes from the 2MASS catalogue (on the user's file system) and generates an ASCII format of the stars distributed over the pixels in the field of view in the catalogue style of skymaker. For interactive infrequent access to basically the same features see the 2MASS Image Service.

4.2.2 Function Documentation

4.2.2.1 void usage (char ∗ *argv0*)

Emit a short usage reminder.

Parameters

in	*argv0*	The name of the executable.

Author

> R. J. Mathar

Since

> 2012-11-29

4.2.2.2 int main (int *argc,* char ∗ *argv[]*)

The C++ program TwoMassCnvrt converts portions of the 2MASS catalog to a Skymaker's list file.

The prerequisites of running the program are the regions of interest of the 2MASS catalog in the standard layout in the file system, which are files named ../???/t∗.cat, where the three question marks are the three digits of the quantized declination (measured from 0 of the southern pole up to 179).

This means the program will scan these directories, and if some of the files or their lines are missing, the stars that are not found will not be produced by the program either.

The standard output contains lines in the Skymaker format, a 100 followed by the two FITS pixel locations and a magnitude. The standard error contains a snapshot that would be added to the FITS file header of what will be

produced by Skymaker to have a useful WCS system across the FITS image. See the `Makefile` for an example of chaining the operations.

Parameters

in	*argc*	
in	*argv*	The command line options are:

`-D` is followed by the location of the directory of the 2MASS catalog. This is without the `???/t*.cat` portion of the file names.

`-r` is followed by the right ascension (in hours from 0 to 24) of the pointing in the center of the FITS plate. Instead of a floating point number in hours, the RA may also be provided by the standard two-colon hex-format, HH:MM:SS.ss.

`-d` is followed by the declination (in degrees from -90 to 90) of the pointing in the center of the FITS plate. Instead of a floating point number in hours, the DEC may also be provided by the standard two-colon hex-format, +-DD:M-M:SS.ss.

`-p` defines the number of the pixels along x and along y. (We are only dealing with quadratic detector areas.) The product of this with the pixel scale is the two-sided field of view in which stars of the 2MASS catalogue must reside to be copied to the output. Warning: this *must* be the same as the IMAGE_SIZE in the sky.conf file .

`-s` is the pixel scale in units of arcseconds per pixel. Warning: this *must* be the same as the PIXEL_SIZE in the sky.conf file .

`-m` clips the magnitude (in the infrared band, not refering to the visible) of the star list that is put to the output. A number of 8.5, for example, means that only objects brighter than 8.5 (numerically smaller than 8.5) are copied over.

`-b` is followed by a single capital letter, one out of three J, H or K as expected.

`-q` is followed by a number between 0 and 1, which scales the magnitude of the star in the output according to that quantum efficiency.

`-G` generates a start catalogue as used with the display of the GEIRS detector software of the MPIA. If that selection of theoutput format is made, the value of the -q-option is ignored.

The syntax in overview:

```
TwoMassConv [-D 2massdir] [-r RA/h] [-d DEC/deg] [-p px] [-s arcs] [-m mag]
[-b {J,H,K}] > sky.list 2> sky.hdr
```

Author

R. J. Mathar

Since

2012-11-29

4.3 TwoMassCnvrt/TwoMassCnvrt.h File Reference

Classes

- class TwoMassCnvrt

Index