timeappend

April 16, 2023

Abstract

Appends a TIME column to a table.

1 Instruments/Modes

Instrument	Mode
ALL	ALL

2 Use

pipeline processing	no
interactive analysis	yes

3 Description

Applies a TIME column to a table specified by the parameter table. The time values are computed using OAL data through the C++ equivalent of the functions OAL_frameCounterToObt and OAL_obtToTimeTag.

This additional information will allow tasks such as **tabgtigen** to generate GTI data for ODF auxiliary files.

The TIME column is added to a copy of the original dataset. The name of the new dataset is specified through the parameter outset.

In order for this task to compute the times successfully, the following columns must be present in the table:

- FRAME column, of type 32-bit signed int
- CCDID column, of type 8-bit unsigned int

In the case of the PN instrument, an additional column is necessary:

- QUADRANT column, of type 8-bit unsigned int

In addition, if the OAL cannot be initialised by the input dataset, or if the user prefers to set explicit values, the instrument name, datamode and exposure number can be specified on the command line, by setting the parameter withsettings to true, and specifying the appropriate value for the instrument, datamode, node and expnr parameters.

3.1 Examples

To append a TIME column to the MOS1 ODF Auxiliary file 0001_0000010010_M1S00100AUX.FIT, with the OAL state set using the appropriate attributes in the input dataset, the following command can be used:

```
timeappend table=0001_0000010010_M1S00100AUX.FIT:M1AUX1
```

This will write a new dataset called outset.ds, in the current directory.

To set the OAL state using user-specified values for the instrument, datamode and exposure number, one could use:

```
timeappend table=0001_0000010010_M1S00100AUX.FIT:M1AUX1 withsettings=true instrument=EPN datamode=IM
```

As mentioned in the section 3, this task can be used in combination with **tabgtigen** to generate GTI information for an ODF file. Here is an example using a PN aux file. Note an additional task, **epauxcomb**, is used to construct a single table of all the information in both the First and Second tables of the aux file:

```
epauxcomb set=0001_0000010010_PNS00100AUX.FIT outset=b.ds
timeappend table=b.ds:PNAUX1 outset=c.ds
tabgtigen table=c.ds expression='NABOVE==18308 && CYCLE==10'
```

4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints

table	yes	table	eventlist.ds:TABLE	none

Name of input table, in compound set:table notation.

outset	no	data-set	outset.ds	none

Name of output dataset. This includes a copy of all the information in the dataset specified in the first component of the parameter table, plus an additional column in the table specified by the second component of that parameter.

timecolname	no	string	TIME	none

The name of the new column containing time information.

withsettings	no	boolean	false	none

If false, the OAL is initialised using the appropriate attributes in the input event list specified by the parameter `table`. If false, the parameters `instrument datamode` and `expnr` are used to set the OAL state.

instrument	no	choice	EMOS1	EMOS1 EMOS2 EPN RGS1 RGS2 OM

Valid if `withsettings` = true. The name of the instrument. Used only of the parameter `withinstrument` is set to true.

datamode	no	choice	IMAGING	IMAGING Imaging TIMING Timing SPECTROSCOPY Spectroscopy FAST Fast

Valid if `withsettings` = true. The instrument data mode.

node	no	choice	PRIMARY	PRIMARY Primary REDUNDANT Redundant

Valid if `withsettings` = true. The instrument data mode.

expnr	no	integer	1	1-999

Valid if `withsettings` = true. The exposure number appropriate for that event list.

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

There are no errors raised by the task itself. I/O errors will be raised by the DAL.

6 Input Files

1. An input dataset with at least one table. The dataset and table of interest are specified through the parameter `table`. The table of interest must contain:

   - `FRAME` column, of type 32-bit signed int
   - `CCDID` column, of type 8-bit int. In the case of the PN instrument, the allowed range of values is [0,1,2].

   In the case of the PN instrument, an additional column

   - `QUADRANT` column, of type 8-bit int. The allowed range of value is [0,1,2,3].

   is also required.

   If the parameter `withsettings` is false, then the table must also contain the following attributes:

   - `INSTRUME`
   - `DATATYPE`
   - `OBS_ID`
   - `EXP_ID`

7 Output Files

1. The output dataset, containing a copy of the input dataset, plus an additional column, `TIME` of type 64-bit real, added to the table of interest.

8 Algorithm

- Copy table referenced by parameter table to output dataset (specified by parameter outset)
- If withsettings is false, write dummy attributes CCDID, CCDNODE and (if instrument is EPN) QUADRANT, and set OAL state using the i/p event list. Otherwise, set the state according to the parameters instrument, datamode, node, and expnr.
- Access FRAME and CCDID columns of i/p table. If the instrument is EPN, access the QUADRANT column as well.
- Create a new table of the same name as the original in o/p dataset. Create a TIME column in new table.
- For each row of i/p table
  - Get the CCD number: in the case of the MOS/RGS, read the CCDID value. In the case of PN, combine the CCDID and QUADRANT values into a single CCD number.
  - Group the CCD number and FRAME info into a structure, and add this to a linked list.
- End row loop

```
• Sort CCD/FRAME linked list in order of CCD number.
• Group linked list in blocks of constant CCD number
• For each block of constant CCD number
    – Set OAL state for CCD Number
    – Call OAL to convert FRAME values in block into UTC TIME (Using the C++ equivalents
      of the F90 calls OAL_frameCounterToObt and OAL_obtToTimeTag)
• End block loop
• Write out linked list to TIME column.
```

9 Comments

- If the parameter `withsettings` is set to `false`, the OAL is initialised by **timeappend** using an interm version of the output dataset, which is a copy of the input dataset plus the following dataset attributes:

  For EMOS1/2 and RGS:

  - `CCDID` = `1`
  - `CCDNODE` = `0`

  For EPN:

  - `CCDID` = `0`
  - `QUADRANT` = `0`
  - `CCDNODE` = `0`

  These attributes correspond to the default CCD and default node of the instrument in question. In the stage where `TIME` values are actually computed, **timeappend** sets the OAL state to the correct CCD explicitly, so the attributes `CCDID` and/or `QUADRANT` bear no affect on the eventual outcome of this task. The value of the attribute `CCDNODE`, on the other hand, does. The setting applied corresponds to the default PRIMARY node; if the user wishes to switch to the redundant node, then s/he should set the instrument properties explicitly via the `withsettings`and associated parameters.

- See section **??** for efficiency considerations.

References