

# ADAMS

Advanced **D**ata mining **A**nd **M**achine learning **S**ystem

Module: adams-spreadsheet



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# Chapter 1

## Introduction

Tabular data is a very common data format, not only for machine learning. The *spreadsheet* module offers some basic spreadsheet support for reading/writing and some generic actors. Other modules, like the *odf* or *excel* one, offer other native readers and writers. The data read by these readers can be processed with the same actors.





## Chapter 2

# Flow

The following sources are available:

- *NewSpreadSheet* – for creating an empty spreadsheet with pre-defined columns.
- *SpreadSheetDbReader* – turns results from SQL queries into spreadsheet objects.<sup>1</sup>

The following transformers are available:

- *SpreadSheetAnonymize* – for anonymizing columns.<sup>2</sup>
- *SpreadSheetColumnFilter* – filters columns using a column finder scheme.<sup>3</sup>
- *SpreadSheetColumnIterator* – iterates over all the columns in the spreadsheet and outputs the names.<sup>4</sup>
- *SpreadSheetColumnsByName* – generates a new spreadsheet with only the columns that match a regular expression (inverting is possible as well).
- *SpreadSheetCopyColumns* – copies the content of a range of columns into new columns.
- *SpreadSheetDifference* – computes the difference between two spreadsheets.
- *SpreadSheetFileReader* – for reading spreadsheet files.<sup>5</sup>
- *SpreadSheetGetCell* – retrieves the value of a specific cell in the spreadsheet.<sup>6</sup>
- *SpreadSheetInfo* – generates basic information on the spreadsheet object.
- *SpreadSheetInsertColumn* – inserts a column in the spreadsheet, initializes the cells with a user-defined value.
- *SpreadSheetInsertRow* – inserts a row in the spreadsheet, initializes the cells with a user-defined value.
- *SpreadSheetPlotGenerator* – turns a spreadsheet into plot containers to be displayed in the *SequencePlotter* sink.<sup>7</sup>

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<sup>1</sup>adams-spreadsheet-database\_access.flow

<sup>2</sup>adams-spreadsheet-anonymize\_columns.flow

<sup>3</sup>adams-spreadsheet-filter\_columns.flow

<sup>4</sup>adams-spreadsheet-iterate\_cols.flow

<sup>5</sup>adams-spreadsheet-output\_cells.flow

<sup>6</sup>adams-spreadsheet-output\_cells.flow

<sup>7</sup>adams-spreadsheet-spreadsheet\_plot1.flow,      adams-spreadsheet-spreadsheet\_plot2.flow,  
adams-spreadsheet-statistic.flow

- *SpreadSheetRemoveColumn* – removes a column from a spreadsheet.
- *SpreadSheetRemoveRow* – removes a row from a spreadsheet.
- *SpreadSheetReplaceCellValue* – replaces cell values that match a regular expression.
- *SpreadSheetRowFilter* – filters rows using a row finder scheme.<sup>8</sup>
- *SpreadSheetSetCell* – sets the value of a specific cell in the spreadsheet.<sup>9</sup>
- *SpreadSheetSort* – sorts a spreadsheet using an arbitrary number of columns (ascending or descending).
- *SpreadSheetStatistic* – calculates statistics using the data stored in the spreadsheet.<sup>10</sup>
- *SpreadSheetSubset* – for obtaining a subset of the spreadsheet object (subset of columns and/or rows).

The following sinks are available:

- *SpreadSheetDbWriter* – for storing a spreadsheet in a database.<sup>11</sup>
- *SpreadSheetDisplay* – for displaying spreadsheet objects in tabular form.<sup>12</sup>
- *SpreadSheetFileWriter* – writes a spreadsheet object to a file with the chosen writer class.

The following conversion schemes are available:

- *AggregateSpreadSheet* – aggregates rows in a spreadsheet (min, max, average, standard deviation, etc).
- *ContainerToSpreadSheet* – for converting any flow container (e.g., a prediction container) into a spreadsheet for better visualization.
- *ConvertSpreadSheetRows* – converts the data rows in a spreadsheet into a different format, e.g., into sparse representation.
- *ConvertStringColumnToDate* – converts strings values in a column to date objects.
- *ConvertStringColumnToTime* – converts strings values in a column to time objects.
- *DoubleMatrixToSpreadSheet* – converts a two-dimensional double array (i.e., matrix) into a spreadsheet object.
- *MergeSpreadSheetColumns* – merges two or more columns in a spreadsheet into a single one.
- *NotesToSpreadSheet* – generates a spreadsheet from a Notes object.
- *RenameSpreadSheetColumn* – renames a single column in a spreadsheet.
- *StringToSpreadSheet* – parses a string in CSV format and turns it into a spreadsheet object.
- *TransposeSpreadSheet* – swaps columns with rows.

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<sup>8</sup>adams-spreadsheet-filter\_rows.flow

<sup>9</sup>adams-spreadsheet-set\_cells.flow

<sup>10</sup>adams-spreadsheet-statistic.flow

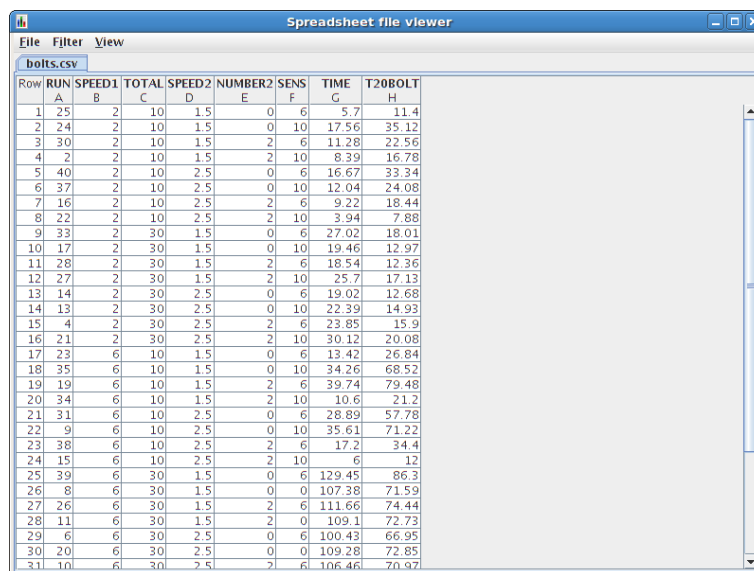
<sup>11</sup>adams-spreadsheet-database\_access.flow

<sup>12</sup>adams-spreadsheet-display.flow

## Chapter 3

# Tools

The *Spreadsheet file viewer* is a simple tool for viewing all spreadsheet file formats that ADAMS supports. Figure 3.1 shows a dataset that was loaded from a CSV (comma-separated values) file.



The screenshot shows a window titled "Spreadsheet file viewer" with a menu bar containing "File", "Filter", and "View". Below the menu bar, the file name "bolts.csv" is displayed. The main area contains a table with the following data:

Row	RUN	SPEED1	TOTAL	SPEED2	NUMBER2	SENS	TIME	T20ROLT
A	B	C	D	E	F	G	H	
1	25	2	10	1.5	0	6	5.7	11.4
2	24	2	10	1.5	0	10	17.56	35.12
3	30	2	10	1.5	2	6	11.28	22.56
4	2	2	10	1.5	2	10	8.39	16.78
5	40	2	10	2.5	0	6	16.67	33.34
6	37	2	10	2.5	0	10	12.04	24.08
7	16	2	10	2.5	2	6	9.22	18.44
8	22	2	10	2.5	2	10	3.94	7.88
9	33	2	30	1.5	0	6	27.02	18.01
10	17	2	30	1.5	0	10	19.46	12.97
11	28	2	30	1.5	2	6	18.54	12.36
12	27	2	30	1.5	2	10	25.7	17.13
13	14	2	30	2.5	0	6	19.02	12.68
14	13	2	30	2.5	0	10	22.39	14.93
15	4	2	30	2.5	2	6	23.85	15.9
16	21	2	30	2.5	2	10	30.12	20.08
17	23	6	10	1.5	0	6	13.42	26.84
18	35	6	10	1.5	0	10	34.26	68.52
19	19	6	10	1.5	2	6	39.74	79.48
20	34	6	10	1.5	2	10	10.6	21.2
21	31	6	10	2.5	0	6	28.89	57.78
22	9	6	10	2.5	0	10	35.61	71.22
23	38	6	10	2.5	2	6	17.2	34.4
24	15	6	10	2.5	2	10	6	12
25	39	6	30	1.5	0	6	129.45	86.3
26	8	6	30	1.5	0	0	107.38	71.59
27	26	6	30	1.5	2	6	111.66	74.44
28	11	6	30	1.5	2	0	109.1	72.73
29	6	6	30	2.5	0	6	100.43	66.95
30	20	6	30	2.5	0	0	109.28	72.85
31	10	6	30	2.5	2	6	106.46	70.97

Figure 3.1: Viewer for spreadsheet files.

If there are more spreadsheet file formats registered, you can save the currently displayed spreadsheet in another format. Printing, of course, is available through the *Send to* menu. By default, the viewer displays each cell with as many digits after the decimal point as necessary. But you can also unify this and specify how many digits should be used for all floating point cells.

### 3.1 Filtering and processing

The viewer supports some basic filtering and processing:

- *columns* – creates a subset of the spreadsheet by selecting a subset of columns, e.g., all columns which name starts with a certain string.
- *rows* – creates a subset of the spreadsheet by selecting a subset of rows, e.g., rows with a certain value in a column.
- *convert* – applies a conversion scheme specific to spreadsheets, e.g., transposing a spreadsheet.
- *transform* – applies a flow transformer specific to spreadsheets, e.g., inserting a column or creating a subset.

Figures 3.2 and 3.3 show the setup for a row finder filter and the resulting new spreadsheet.

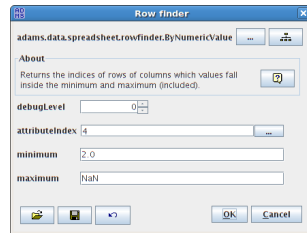


Figure 3.2: Row finder setup.

Row	RUN	SPEED1	TOTAL	SPEED2	NUMBER2	SENS	TIME	T2000LT
1	40	2	10	2.5	0	6	16.67	33.34
2	37	2	10	2.5	0	10	12.04	24.08
3	16	2	10	2.5	2	6	9.22	18.44
4	22	2	10	2.5	2	10	3.94	7.88
5	14	2	30	2.5	0	6	19.02	12.68
6	13	2	30	2.5	0	10	22.39	14.93
7	4	2	30	2.5	2	6	23.85	15.9
8	21	2	30	2.5	2	10	30.12	20.08
9	21	6	10	2.5	0	6	28.89	57.78
10	9	6	10	2.5	0	10	35.61	71.22
11	38	6	10	2.5	2	6	17.2	34.4
12	15	6	10	2.5	2	10	6	12
13	6	6	30	2.5	0	6	100.43	66.95
14	20	6	30	2.5	0	0	109.28	72.85
15	10	6	30	2.5	2	6	106.46	70.97
16	32	6	30	2.5	2	0	134.01	89.34
17	1	4	20	2	1	8	10.78	10.78
18	3	4	20	2	1	8	9.39	9.39
19	5	4	20	2	1	8	9.84	9.84
20	7	4	20	2	1	8	13.94	13.94
21	12	4	20	2	1	8	12.33	12.33
22	18	4	20	2	1	8	7.32	7.32
23	29	4	20	2	1	8	7.91	7.91
24	36	4	20	2	1	8	15.58	15.58

Figure 3.3: The filtered spreadsheet.

### 3.2 Plug-ins

The viewer can be extended with two sorts of plug-ins:

- ones that generate a view based on the current sheet (“view”)
- ones that process the current sheet (“data”)

#### 3.2.1 View plug-ins

A view plug-in is derived from the following super-class:

```
adams.gui.tools.spreadsheetviewer.AbstractViewPlugin
```

There are three methods that need implementing:

- *getMenuText()* – returns the text used for the menu item and the title of the dialog displaying the generated view.
- *getMenuIcon()* – returns the name of the icon (no path) that should be displayed in the menu (use null to display no icon).

- *doGenerate(SpreadSheet)* – this method generates the actual view in form of a *adams.gui.core.BasePanel*.

An example is the *Statistics* plug-in, which shows simple statistics for a spreadsheet, number of rows and columns and what types of columns are present:

```
adams.gui.tools.spreadsheetviewer.Statistics
```

### 3.2.2 Data plug-ins

A view plug-in is derived from the following super-class:

```
adams.gui.tools.spreadsheetviewer.AbstractDataPlugin
```

There are four methods that need implementing:

- *getMenuText()* – returns the text used for the menu item and the title of the dialog displaying the generated view.
- *getMenuIcon()* – returns the name of the icon (no path) that should be displayed in the menu (use null to display no icon).
- *doProcess(SpreadSheet)* – this method processes the current spreadsheet and returns a new spreadsheet object.
- *isInPlace()* – returns whether the generated spreadsheet object should simply replace the current one (“in-place”) or added as new tab.



# Bibliography

- [1] *ADAMS* – Advanced Data mining and Machine learning System  
<https://adams.cms.waikato.ac.nz/>