

SECTION 5: FUNCTORS

Introduction

A functor is a “structure preserving” interpretation of one finitely presented category into another.

A functor preserves the structure of a category because it sends:

Objects to Objects
Arrows to Arrows

and it preserves the composition that is provided by relations.

Functor File Types

In GDCT there are two different file types that are associated with functors.

***.fun**

These files are a text only representation of a functor. These files can be both opened and saved. Since a graphical representation of the two categories involved is not saved, the graphical representations are generated randomly upon opening the *.fun file.

***.fgl**

These files contain both a text and graphical representation of the categories involved in a given functor as well as the functor information itself. This type of file can be both opened and saved.

FUN File Format

The text representation of functors is stored in the following three part format.

Part one consists of a category stored in the CAT file format.

Part two consists of a second category stored in the CAT file format.

Part three consists of the functor information. In this part, any line that is a comment must start with the “#” character. On the line following the word “functor” is the functor name. The mapping of objects to objects is listed between the words “objects” and “arrows”. The mapping of arrows to paths is listed after the word “arrows”.

NOTE: The words “category”, “functor”, “objects”, “arrows”, and “gml” are key words and cannot be used as the name of the categories, functors between them or as the name of an object or arrow within categories.

An example of a typical FUN file can be found in Appendix C.

FGL File Format

Part one consists of a category stored in the CGL file format.

Part two consists of a second category stored in the CGL file format.

Part three consists of the functor information. In this part, any line that is a comment must start with the “#” character. On the line following the word “functor” is the functor name. The mapping of objects to objects is listed between the words “objects” and “arrows”. The mapping of arrows to paths is listed after the word “arrows”.

NOTE: The words “category”, “functor”, “objects”, “arrows”, and “gml” are key words and cannot be used as the name of the categories, functors between them or as the name of an object or arrow within categories.

An example of a typical FGL file can be found in Appendix A.

FGL File Format



Creating Functors

To create a functor the user selects File | New Functor, and enter a functor name. Then select the domain category by clicking “Browse”, which opens a file selection window. Then do the same for the codomain category, and click Next. This opens the selected

categories to enable the user to easily choose mappings for the functor. Select an object in the “Domain” list (i.e. an object from the domain category) and its corresponding object in the “Codomain” list. Continue until all domain objects are gone. Then you will need to choose the arrow mappings; first select an arrow from the domain category, then input a codomain path of composable arrows and click “Add Mapping”. Click “Done” when finished, and the functor will be displayed.

The name of the functor can be a string of any length except for reserved words and may contain any ASCII characters excluding “: - > * # . = ,”

Opening Functors

In order to open a stored functor file (.fun or .fgl) select File | Open Functor. If there is any error in the format of the selected file an error message is displayed and the open is aborted.

Downloading Functors

In order to download a functor file (.fun or .fgl) select File | Download Functor. The functors listed are located on the server specified in the frame's title bar. To select a functor to download simply double click on the functor's name or click once on the functor name and press the OK button. Either of these methods will display the downloaded functor. If the program cannot locate the files on the server an error message will be displayed. This could result from the user not being connected to the Internet or as a result of a server error.

To change the settings for downloading functors, select Settings | Set Server. This displays a dialog for changing the default server and directories from which categories and functors can be loaded using the appropriate load command.

Saving Functors

In order to save a functor in memory select File | Save or File | Save As.

Diagram Display

Functors can also be viewed as diagrams, with the graphical display taken from the domain category and the object and arrow names taken from the codomain category. To view a functor as a diagram, click the “Diagram Display” button in the top left corner when a functor is open. To switch back to normal functor display mode, click the “Two Category Display” button.

NOTE: When first opened, a functor's diagram display has a newly created graph with object positions taken from the domain category. A diagram graph is NOT saved in either functor file format.