Antipode formulas for pattern Hopf algebras

Raul Penaguiao and Yannic Vargas
San Francisco State University, California US
raulpenaguiao@sfsu.edu

Swiss National Science Foundation

Hopf monoids in species

A species is a mapping h : $I \mapsto$ { structures on I}
Examples of species: graphs Gr with vertex set I, generalized permutahedra in $\mathbb{R}^I$.
Species can be endowed with a **product** and a **coproduct** Product and coproduct satisfy the followig:

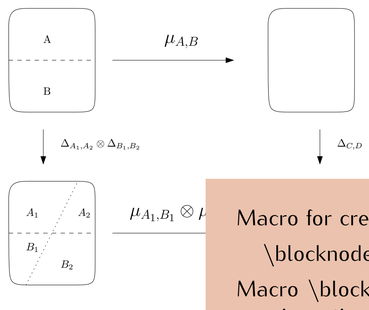

Fig. 1: The commutati

Examples on graphs

$$\mu(G_1, G_2) = \text{ disjoint}$$

$$\Delta G = \sum_{A \subseteq I} G$$

Macro for creating a block node:

\blocknode{Block Title}{Block Content}

Macro \blocknode has three parameters. The first one is optional and it is the position of the block. The first block will be automatically placed to ($(firstrow)-(xshift)-(yshift)$), which is the left corner below the title block. In most of the templates, (firstrow) is set to (title.south), where *title* is the alias for the title block. Each subsequent block is automatically placed to [($(box.south)-(yshift)$)], i.e., below the previous block aliased *box*. You can also use an explicit parameter, e.g., $(-10, 30)$ (note that (0,0) is the center of the poster). The second parameter is the title of the block. Finally, the last parameter is the actual content.

Permutation pattern Hopf algebras

Theorem [Vargas, 2016]

The permutation pattern Hopf algebra is free commutative

\innerblock{Theorem}{Statement}

Text

\innerblockplain[colorone!80!]{Text}

Text

\coloredbox{colorthree!50!}{Text}

Variable Width Block Nodes

You can also create blocks of arbitrary width

\blocknodew[coordinate]{Block width}{Block Title}{Block Content}

In this case it is better to specify coordinate manually if you want to have blocks aligned vertically.

Note that (xshift) and (yshift) are coordinates created in macro \initializesizeandshifts, and they allow to have relative positioning of block nodes in an automatic fashion. If you want to define your own shifts, set new values for (xshift) and (yshift) using commands \setxshift and \setyshift.

Also, it might be useful to know the y-coordinate of the south border of the previous block. You can retrieve it by using the command

\getcurrentrow{box} or \getcurrentrow{note}

This coordinate will be stored in (currentrow), which can be used to specify the location of the next block node.

Pattern Hopf algebras

Most pattern Hopf algebras are free. It is conjectured that all such Hopf algebras are free, and there are some partial results.

Block Nodes in the Second Column

To start the second column or the third column use commands

\startsecondcolumn, and \startthirdcolumn.

If the number of columns is 2, then the last command will not have effect.

You can also start a new column with an arbitrary x-coordinate by specifying explicitly the coordinate of the new block node as follows:

\blocknode[($(firstrow)-(yshift)+(x,0)$)]{Block Title}{Block Content}

Useful Macro Within Block Nodes

There are three types of colored boxes/blocks that you can use inside block nodes to highlight information.

Theorem

Statement

\innerblock{Theorem}{Statement}

Text

\innerblockplain[colorone!80!]{Text}

Text

\coloredbox{colorthree!50!}{Text}

The default figure environment does not work within a tikzpicture. I created a new figure environment that can be used instead, based on the code sent by Stephan Thober.

\begin{tikzfigure}[Caption]
...
\end{tikzfigure}

Fig. 2: A shaded circle

There are also callout blocks that allow for a more interesting layout of the poster.

\calloutblock[rotate angle]{from coordinate}{coordinate}{Block Width}{Block Content}

The alias for such blocks is *note*.

Plain blocks These blocks are similar to callout blocks. They allow for specifying the title of the block.

\plainblock[rotate angle]{coordinate}{Block Width}{Block Title}{Block Content}

Personalizing the Poster

It is possible to adjust the layout of the poster. To impose your own setting, you can use these macros:

- Macros for changing sizes

  \setmargin{4}, \setheaddrawingheight{14}, \setinstituteshift{10}, \setblockspacing{2}, \setblocktitleheight{3}

- Other structural macros

  \setcolumnnumber{3}, \usetemplate{6}, \usecolortemplate{4}, \usebackgroundtemplate{5}, \usetitletemplate{2}, \useblocknodetemplate{5}, \useinnerblocktemplate{3}, \useplainblocktemplate{4}

- Macro for adding logos to the title block

  \addlogo[south west]{(0,0)}{6cm}{filename}

- Macros for the basic colors

  \setfirstcolor{green!70!}, \setsecondcolor{gray!80!}, \setthirdcolor{red!80!black}

- Macros for specific colors:

  \setbackgrounddarkcolor{colorone!70!black}, \setbackgroundlightcolor{colorone!70!}, \settitletextcolor{textcolor}, \settitlefillcolor{white}, \settitledrawcolor{colortwo}, \setblocktextcolor{textcolor}, \setblockfillcolor{white}, \setblocktitletextcolor{colorone}, \setblocktitlefillcolor{colortwo}, \setplainblocktextcolor{textcolor}, \setplainblockfillcolor{colorthree!40}, \setplainblocktitletextcolor{textcolor}, \setplainblocktitlefillcolor{colorthree!60}, \setinnerblocktextcolor{textcolor}, \setinnerblockfillcolor{white}, \setinnerblocktitletextcolor{white}, \setinnerblocktitlefillcolor{colorthree},