THE SYMBOL FONT DBNSYMB

DROR BAR-NATAN

Abstract. This is the user manual for the symbol font dbnsymb.

This document is available electronically at http://www.math.toronto.edu/∼drorbn/projects/dbnsymb/.

Contents

1. Introduction

Over the last few years I occasionaly needed new symbols for the papers I was writing: overcrossings (⤯), undercrossings (⤮), pentagons (⬠), whatever. I've always settled for partial and ad-hoc solutions — drawing little LaTeX figures, combining existing symbols, etc. But if the AMS can have its own symbol package (amssymb.sty), why can't I have one too, with symbols to my liking, which are placed and scaled just like TeX's own?

dbnsymb is an attempt to create this personal font. I plan to use it in my own papers and ship it with those when I ship them out, just like I ship macros and figures. I plan to continue adding symbols to it as needed (or as requested by others) and to continue improving the existing symbols in it.

This document documents dbnsymb, it's usage, and how it can be modified. If you also need wheels (⌑) or double points (⨯) or anything else that's in, feel free to use it yourself. Finally, if you need your own symbols too, you are welcome to download dbnsymb and use it as a basis for your own modifications. I will also be happy to add symbols to dbnsymb for you, provided they are likely to be of interest for me and/or others with similar research interests.

2. Usage

To use dbnsymb, you need to have the files dbnsymb.mf and dbnsymb.sty somewhere where LaTeX would see them — your current working directory or in any other place where LaTeX

Date: This Edition: Mar. 2, 2020; Revision History: Section 7.

looks. These files can be downloaded by clicking on their names on the html version of this manual, which is available at http://www.math.toronto.edu/~drorbn/projects/dbnsymb/.

This done, you should include the package `dbnsymb.sty` in your document, cross your fingers, and hope for the best.

3. Example

If all goes well and the files `dbnsymb.mf` and `dbnsymb.sty` really are in LaTeX's sight, the following example file should produce the output that follows it:

```
\documentclass{article}
\usepackage{dbnsymb}
\begin{document}
Here's a famous formula:
\[ V(\doublepoint) := V(\overcrossing) - V(\undercrossing), \]
and here's another way of writing it, with the new symbols as
superscripts:
\[ V(K^\doublepoint) := V(K^\overcrossing) - V(K^\undercrossing). \]
\end{document}
```

Here's a famous formula:

$$V(\doublepoint) := V(\overcrossing) - V(\undercrossing),$$

and here's another way of writing it, with the new symbols as superscripts:

$$V(K^{\doublepoint}) := V(K^{\overcrossing}) - V(K^{\undercrossing}).$$

A more extensive example is this manual page itself. The source files are available from the html version of this manual, at http://www.math.toronto.edu/~drorbn/projects/dbnsymb/.

4. The symbol table

Symbol	LaTeXcommand	Usage example
	`\doublepoint`	$V(\doublepoint)$
	`\overcrossing`	$V(\overcrossing)$
	`\undercrossing`	$V(\undercrossing)$
	`\virtualcrossing`	Virtual crossings ($\virtualcrossing$) are endemic to quantum algebra
	`\semivirtualover`	Semi-virtuals are differences: $\semivirtualover \leftrightarrow \overcrossing - \virtualcrossing$.
	`\semivirtualunder`	$\virtualcrossing \leftrightarrow \semivirtualover - \semivirtualunder$.
	`\slashoverback`	$\langle\slashoverback\rangle$
	`\svslashoverback`	$\svslashoverback = \slashoverback - \virtualcrossing$

Symbol	LaTeXcommand	Usage example
	`\backoverslash`	$\langle \diagdown \rangle$
	`\svbackoverslash`	$\otimes = \times - \times$
	`\Associator`	$\diagup\!\!\mid$ and $\times$ generate parenthesized tangles.
	`\righttwist`	"$\backsim$" denotes a ribbon with a right-handed twist
	`\lefttwist`	"$\backsim$" denotes a ribbon with a left-handed twist
	`\MobiusSymbol`	"$\circlearrowleft$" denotes the trivially embedded Möbius band
	`\crossing`	
	`\smoothing`	$zC(\,)(\,)$
	`\upupsmoothing`	The Conway relation $C(\nwarrow\!\!\nearrow) - C(\nwarrow\!\!\nwarrow) = zC(\,)(\,)$
	`\hsmoothing`	The A_1 relation: $\asymp = 2\hbar(\asymp - \times)$
	`\HSaddleSymbol`	The cobordism $\asymp :)(\to \asymp$
	`\ISaddleSymbol`	The cobordism $\asymp : \asymp \to)($
	`\fourinwheel`	The cobordism $\bigcirc : \bigcirc \to \emptyset$
	`\twowheel`	$\Omega = 1 + \frac{\circ\!\!-\!\!\circ}{48}$
	`\fourwheel`	The wheeled Kontsevich integral $Z^{\boxtimes}(K)$
	`\pentagon`	The $\pentagon_m$ equation
	`\hexagon`	The $\hexagon_{\pm}$ relations
	`\tetrahedron`	$\triangle$ is $6j$
	`\isolatedchord`	The framing correction $e^{f\frac{\hat{\cdot}}{2}}$
	`\righttrefoil`	$J(\circledcirc) = -t^4 + t^3 + t$
	`\lefttrefoil`	$J(\circledcirc) = -t^{-4} + t^{-3} + t^{-1}$
	`\OpenHopfUp`	The open Hopf link ϕ_x^y
	`\OpenHopf`	The undirected open Hopf link ϕ_x^y
	`\HopfLink`	$Z^{\boxtimes}(\oslash) = \langle \Omega, \Omega \rangle \exp {}^{x}\!\!\frown^{y}$
	`\botright`	$\sigma_y Z(\phi_x^y) = \Omega_y \exp_{\#}(\perp_x^y)$

Symbol	LaTeXcommand	Usage example
	`\SGraph`	The STU relation: $\Upsilon = \sqcup - \chi$
	`\TGraph`	$\sqcup = \Upsilon + \chi$
	`\UGraph`	$\chi = \sqcup - \Upsilon$
	`\IGraph`	The IHX relation: $\curlyvee = \curlywedge - \times$
	`\HGraph`	$\curlywedge = \curlyvee + \times$
	`\XGraph`	$\times = \curlywedge - \curlyvee$
	`\YGraph`	The AS relation: $Y + \curlyvee = 0$
	`\FlippedYGraph`	The w-vertices: $\{Y, \curlyvee\}$
	`\TwistedY`	$\curlyvee = -Y$
	`\ThetaGraph`	$Z(\ominus) = \nu^{1/2} \otimes \nu^{1/2} \otimes \nu^{1/2}$
	`\dumbbell`	
	`\wiggle`	$Z^{\text{naive}}(\cap\!\!\smile) = \nu^{-1}$
	`\stonehenge`	The Stonehenge pairing $\langle D, K \rangle_{\text{⊓}}$
	`\inup`	$\begin{matrix} X \\ \Cup \\ x \end{matrix}$
	`\actsonleft`	G acts on X on the left: $G \circlearrowleft X$
	`\actsonright`	G acts on X on the right: $X \circlearrowright G$
	`\isotopic`	
	`\horizontalchord`	$Z^u(\nwarrow\!\!\nearrow) = \exp(\uparrow\!\!\uparrow)\times$
	`\rightarrowdiagram`	$Z^w(\nwarrow\!\!\nearrow) = \exp(\uparrow\!\!\mapsto)\times$
	`\leftarrowdiagram`	$Z^w(\nwarrow\!\!\nearrow) = \exp(-\uparrow\!\!\mapsto)\times$
	`\cappededge`	$\mathcal{A}^w(\uparrow)$
	`\upcap`	In $\mathcal{A}^w(\bullet\uparrow)$, only wheels survive
	`\downcap`	$\downarrow\!(D)$ cups the bottoms of the strands of D
	`\doubletree`	The $\circledcirc$ map is key to associators and Z^w.

Symbol	LaTeXcommand	Usage example
◹	`\uppertriang`	$\ulcorner \subset gl_n$ represents the upper triangular matrices.
◺	`\lowertriang`	$\llcorner \oplus \ulcorner = gl_n \oplus \mathfrak{a}_n$.
Ⓤ	`\OU`	Ⓤ means Over then Under.
🇨🇦	`\CanadianFlag`	`Canad$\overset{\CanadianFlag}{\text{a}}$`: Canadä
☐	`\dbnframe`	`\hbox to 0pt{$\slashoverback$}$\dbnframe$`: ☒

5. Modifying dbnsymb

The symbols in `dnsymb` were all drawn using `xfig`, an X-windows drawing program, and then converted to metafont using `fig2dev` (a standard companion program to `xfig`) assisted by a simple `perl` script that I wrote.

To add new symbols or create your own symbol font, follow the following steps:

- Pick a new name for your font or addition; I would much prefer that you don't reuse the name `dbnsymb`. For the sake of concreteness, I will assume below that the name you have picked is "`dptsymb`".
- Download the `perl` script `makefont`, save it, and make it executable on your machine.
- Create a directory for the `xfig`-generated `.fig` files containing the symbols (for the sake of concreteness, let's call this directory `figs`). You can start with an empty `figs` directory or start with the `.fig` files used for the creation of `dbnsymb` by downloading, uncompressing and unpacking the file `figs.tar.gz`.
- Use `xfig` to draw your favorite symbols and to save them in the directory `figs`. You should fit your drawing within the 4in by 4in rectangle bounded by the horizontal and vertical 1in and 5in lines on the `xfig` canvas. The `dbnsymb` symbol `\dbnframe` (☐) is precisely that rectangle; if you wish, you can extract the file `figs/040dbnframe.fig` from `figs.tar.gz` and use it as your guide. When saving a symbol in the directory `figs`, use the file name format `figs/nnnxxxxxx.fig`, where "`nnn`" is the 3-digit decimal character code you wish to use for that symbol (0–255), and the arbitrary length string `xxxxxx` is that symbol's name.
- Run the script `makefont` to create the files `dptsymb.mf` and `dptsymb.sty` (in the current working directory) by typing "`makefont -fn dptsymb -s figs`".
- You are done. Use the files `dptsymb.mf` and `dptsymb.sty` as if they were the files `dbnsymb.mf` and `dbnsymb.sty` of Section 2.

The script `makefont` has an additional optional parameter, `-f2m_opts` *filename*, that may contain symbol by symbol options for `fig2dev`. See the manual page for `fig2dev` and the options file `dbnsymb.f2m-opts` used for the creation of `dbnsymb`.

6. Acknowledgement

I wish to thank Dylan P. Thurston for his comments, suggestions and extra symbols. The base for the Canadian flag symbol 🇨🇦 came from the Xfig Flag Library.

7. Revision History

March 3, 2020: ⅄ added.
September 29, 2019: ⟩⟨ added.
April 1, 2017: ⓤ added.
January 28, 2017: ◹ and ◺ added.
October 8, 2015: ⭳ added.
January 27, 2014: ⊬ added.
August 12, 2013: Minor tweaking.
November 30, 2011: ⟡ added.
May 29, 2010: ⥉ added.
September 25, 2009: ⤫ and ⤬ added.
April 19, 2009: ⍑ added.
November 28, 2008: ⊂ and ⊃ added.
November 12, 2008: ⊭ and ⊮ added.
September 25, 2008: ⤪ and ⤭ added.
August 22, 2008: ⤨ added.

October 29, 2003: Canadä added!
October 27, 2003: Move to Toronto, some new symbols.
November 11, 2001: Some new symbols.
October 21, 2001: Some new symbols.
March 22, 2001: Bigger sized symbols in Section 4 in the html version.
January 25, 2001: Some new symbols.
May 18, 2000: Some new symbols, sizes adjusted so that □ ≃ □ (`$\dbnframe\simeq\square$`).
May 7, 2000: Minor modifications and some extra symbols added.
April 26, 2000: Minor modifications.
April 25, 2000: Added "full mirror" download option.
April 24, 2000: Added a few symbols and Sections 5, 6 and 7 and made a few minor modifications.
March 19, 2000: First version posted.

Department of Mathematics, University of Toronto, Toronto Ontario M5S 3G3, Canada
Email address: drorbn@math.toronto.edu
URL: http://www.math.toronto.edu/~drorbn