Worldflags

Drawing flags with TikZ

Wilhelm Haager wilhelm.haager@htlstp.ac.at

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1 Introduction

Worldflags is a package for drawing flags using TikZ. Currently the national flags of all independent nations are included, additionally some other flags of various organizations; there's more to come.

A particular flag is selected via a parameter; for national flags that is the two-letter country code (i. e. the domain name). A flag can be drawn in two ways:

- as a single TikZ-picture within ordinary text
- as a picture element within a TikZ-picture

The appearance of a flag (size, frame etc.) can be adapted using optional parameters.

The description of every flag resides in a particular flag description file worldflag_xx.tex, wherein xx is the parameter for selecting a particular flag, as listed in section 4. That saves memory and computing time on the one hand, as only the required flags have to be loaded. On the other hand, the package can easily be extended by adding new flag description files.

Some flags with complicated emblems (e. g. Afghanistan, Ecuador) require a lot of memory. Thus an expansion of T_EX 's main memory size is recommended.

The flag descriptions are based on the construction sheets in [1] (thanks to Mello Luchtenberg for that great website), complex emblems have been taken from the svg-files on Wikipedia and have been translated into Tikz via Inkscape (with a reasonable amount of manual post editing).

2 Usage

2.1 Flags as single TikZ-pictures

Commands:					
\worldflag[opts]{xx}	draws the flag <i>xx</i> with the optional parameters <i>opts</i> as a particular TikZ-picture.				
\flagsdefault[opts]	sets default values for the options <i>opts</i> for subsequent flags.				
Options:					
width=dimension	sets the flag width, default: 15 mm.				
length=dimension	sets the flag length; if set to 0 pt (default), the length is calculated according to the proper aspect ratio of the flag.				
framewidth=dimension	sets the line width of the frame around the flag, de-fault: 0.2 mm.				
<pre>framecolor=colorname</pre>	sets the color of the flag frame, default: black!60.				
stretch=number	controls stretching and shrinking of geometric shapes when the aspect ratio differs from its proper value.				
grid	causes a millimeter-grid drawn on the flag as an aid for constructing new flags.				
noemblem	supresses the drawing of an emblem, which is part of many flags.				
emblem	enforces the drawing of an emblem onto the flag which is otherwise supressed (currently only applies to the flags of Austria and Germany).				
emblemdefault	restores the default behavior for drawing emblems.				
variant=x	selects a variant x of a flag (default: 0).				

 $\mbox{worldflag{xx}}$ draws a flag, selected by the parameter *xx*, as a single TikZ-picture. Section 4 lists all available flags and their selection code *xx*. Various properties of the flag can be specified with additional optional parameters as key-value pairs.

\flagsdefault[opts] specifies default values for the Options opts for subsequent flags.

The *width* of a flag defaults to 15 mm, it can be overridden with the option width. If one of the dimensions *width* or *length* is set to 0 pt (which is the default value for *length*), its value results from the proper aspect ratio width/length, which is proprietary to every flag. E. g. the Swiss flag is quadratic, it has an aspect ratio of 1:1, the British flag has an

aspect ratio of 1:2. If width is set to 0 pt, length *must* be specified. If both dimensions are specified, flags loose their proper aspect ratio but get the same size:



If both width and length of a flag are specified, which differs from ist proper aspect ratio, some geometries on the flag will unavoidably get distorted. There is presumably no general rule whether certain *distances* on the flag should remain unchanged in that case, or certain *ratios* – as flag owners do not intend to distort their flags – but that behavior can be influenced for many flags applying the option **stretch**. If stretch is set to 0 (which is default), certain *distances* and *sizes* on the flag remain unchanged, when the flag is stretched; if set to 1, certain *ratios* remain unchanged in that case. Values within the range of 0...1 are possible to get a compromise between both cases.

The following examples illustrate that behavior:

Canada: **stretch=0** The *size* of the maple leaf remains unchanged.

stretch=1 The *ratio* of the widths – maple leaf and pale – remains unchanged; the maple leaf has to shrink.



Denmark: **stretch=0** The *distance* from the vertical bar to the hoist remains unchanged.

stretch=1 The *ratio* of the distances to the hoist and to the fly remains unchanged.



The option **grid** causes a millimeter-grid drawn over the flag. That is primarily a measuring aid for the construction of new flags.

The options framecolor and framewidth set the color and the line width of the frame drawn around the flag, respectively. The default value for the line width is 0.2 mm, the default color is black!60. If framewidth is set to 0 mm (or 0 pt), no frame is drawn at all.

Code:	Result:
<pre>\flagsdefault[framecolor=blue] \worldflag[grid]{IT} \worldflag[framewidth=1mm]{IT} \worldflag[framewidth=0mm]{IT}</pre>	

Many flags have an emblem on it, e.g. a coat of arms or a special symbol. Those emblems are often very complex and require a lot of computing time and memory. The depiction of such an emblem can be supressed with the option noemblem, either for the sake of saving computing time (for drafts) or just because simplified version of the flag is required. Some countries distinguish between a *civil* flag without an emblem and a *state* flag containing an emblem.

Some flags don't have an emblem by default, but an emblem is available for special purposes. In that case the depiction of the emblem can be enforced with the option emblem. Currently that only applies to the country flags of Austria, Germany and Spain (more will come). The option emblemdefault restores the default behavior for drawing emblems.



The emblem (i. e. the coat of arms) in the Austrian flag is supressed by default, the emblem in the Croatian flag is depicted default.

Some flags have several variants on disposal which can vary in geometry, colors etc. A certain variant is selected by the option variant (default: 0). For example, the flag of the Italian region Veneto has a variant with a quadratic flag area and appended stripes, as well as a variant with a rectangular flag area where the stripes are included:



Some flags with complex elements (e.g. the Austrian flag with emblem) have an additional variant with an included pdf-Image instead of *TikZ*-code. Putting up with some loss in flexibility, that saves memory and computing time.

2.2 Flags as picture elements within a TikZ-picture

Within a Tikz-picture the flags are available as *pic*-Elements named **worldflag**. A particular flag is selected with the option **country**. Unlike *nodes*, *pic*-elements cannot be referenced by name, but named nodes and coordinates within the *pic*-element can be referenced. Hence every flag has special coordinates for referencing:

-0 center of flag	
<pre>-nw upper left corner ("north-west")</pre>	-n top edge center ("north")
<pre>-ne upper right corner ("north-east")</pre>	-e fly edge center ("east")
-sw lower left corner ("south-west")	-w hoist edge center ("west")
-se lower right corner ("south-east")	-s bottom edge center ("south")

Some additional options for rotating and shearing a flag are available.

<i>Command:</i> \pic (<i>xy</i>) [country= <i>xx</i> ,] at <i>pos</i> {worldflag}; draws the flag <i>xx</i> and gives it the name <i>xy</i> ; the flag is centerd at the coordinate <i>pos</i> .
Additional Options:	centera at the coordinate post
rotate= α	rotates the flag α degrees around its center.
turn= β	rotates the flag β degrees around the (imaginary) flagpole.
hang=γ	lets the flag "hang down" γ degrees from the (imaginary) flag pole.

The following example illustrates the usage of the special coordinates:



The option **rotate** causes the flag to be rotated around the flag center with a given angle in degree.

Note: That option is not proprietary to flags, it is a general option for *any* pic-element. Hence it is *not* possible to give it a default value with the command flagsdefault.



The option **turn** lets the flag rotate around the imaginary flagpole with a given angle β (in degrees). The length of the flag will *seemingly* shrink with a factor of $\cos \beta$. With a value of $\beta = 180$ the flag will just appear mirrored. The option hang lets the flag "hang down" from the imaginary flagpole with a given angle γ (in degrees); the flag will be sheared and compressed accordingly.

The following example shows a combination of rotate, turn and hang.



3 Internals

This section is intended for those who want to *extend* the worldflags package and create new flags. Those who just want to *use* the package and draw existing flags, need not read it.

Evey flag resides in a particular "flag description file" named worldflag_xx.tex, wherein xx is the code for selecting a flag. Extending the package with new flags is quite easy: Just a flag description file for every new flag has to be written and put into a directory, where $T_{E}X$ can find it. No configuration files, no other actions; that's it.

3.1 Flag description file

Every flag description file has the following structure:

```
\begin{flagdescription}{{$} ①
\definecolor{red}{RGB}{r,g,b} ②
\definecolor{gold}{RGB}{r,g,b}

...
③
...
③
...
\framecode{code} ④
\end{flagdescription} ⑤
```

① All commands describing the geometry of a flag have to be within the environment flagdescription. This environmant requires a parameter ξ, which specifies the proper aspect ratio width/length of a flag. Using that parameter, the flag length is calculatend from the flag width (or vice versa). As ξ is further processed using \pgfmathparse, is can be specified as a floating point number or as a ratio of two (preferably integer) numbers.

Furthermore, two nested scopes are opened: The outer scope sets the drawing unit to \flagwidth (note: the top edge of a flag has always a *y*-coordinate of 1) and performs the coordinate transformation according to the options turn and hang. The inner scope shifts the coordinate system to the flag center. That shift is only for rotation and positioning of the flag within a TikZ-picture. For the flag description the origin of the coordinate system remains on the lower left corner of the flag.

In the sequel, the special coordinates -0, -n, -ne, -e, -se, -s, -sw, -w and -nw are established – as described in section 2.2.

- ② Every flag has proprietary shadings of colors. Hence even common colors have to be redefined for every flag separately.
- ③ TikZ commands for drawing and filling of shapes make up the core of a flag description file. A couple of macros (see section 3.3) for common geometric figures facilitate the creation of the flag image.

④ *code* is the drawing path for te frame around the flag. In (the most common) case of a rectangular shape of the flag (an exception is e.g. the flag of Nepal) *code* can be left empty; a rectangular frame is drawn automatically in that case.

The line width, set with the option framewidth, is stored in the dimension register **\flagframe**; the frame color, set with the option framecolor, is stored in the macro **\framecolor**.

⑤ At the end of the environment a millimeter-grid is drawn onto the flag, if invoked with the option grid and the two previously opened scopes are closed again.

3.2 Variables

The properties of a flag are kept in variables, which are dimension registers or macros. Those variables are either set by the user via specifying options or are calculated internally. Most of those variables are used internally, only the following few variables are used in the code for the flag description:

Dimension registers:	width of the flog (vortical output)
\flagwidth	width of the flag (vertical extent)
\flaglength	length of the flag (horizontal extent)
Macros:	
$\$	factor for stretching of certain geometries
\flagvariant	contains a single digit (or letter) for branching the code to a particular variant

\flagwidth and \flaglength specify the width and length of a flag. They are set by the user with the options width and length or are calculaterd from each other at the begin of the environment flagdescription internally. \flagwidth is the unit for coordinates and lengths in the flag description.

\stretchfactor is a factor for stretching certain *x*-coordinates, when the whole flag is stretched (or compressed), i.e. when the aspect ratio differs from its proper value. It is calculated from the user option stretch (stored in the macro **\flagstretch**) as follows and can be used in the flag description:

$f_s = 1 + \frac{l - l_0}{l_s} \cdot s,$	with	$f_s \ldots$ the variable <i>stretchfactor</i>
<i>t</i> ₀		$l_0 \dots$ proper aspect ratio of the flag
		$l \ldots$ actual aspect ratio of the flag
		$s \ \ldots \ {\rm value} \ {\rm of} \ {\rm the} \ {\rm user} \ {\rm specified} \ {\rm option} \ {\rm stretch}$

In the following example the yellow diamonds keep their *distances* to the borders of the flag (hoist and fly, respectively), when the flag is stretched or compressed, the white diamonds keep their *relative positions* on the flag in that case.

Code:	Result:
\def\diamond#1#2{\begin{scope}[shift={#2}] \fill [#1] (3/20,0)-(0,4/20)-(-3/20,0)-(0,-4/20);	
$\left(1111 \left[\frac{1}{2} \right] (0, 20, 0) (0, 1, 20) (0, 20, 0) (0, 1, 20), \right)$	
\def%	
\begin{tikzpicture}	
\begin{flagdescription}{2/3}	
\background{cyan}	
$\dim \{yellow\}\{(0.5, 0.75)\}$	
$\dim \{yellow} \{(((flaglength, 0.75)-(0.5, 0))\}$	
$\dim \{white\} \{ (0.5* \ tetchfactor, 0.25) \}$	
\diamond{white}	
$\{((\laglength, 0.25) - (0.5 \times \text{stretchfactor}, 0))\}$	
\end{flagdescription}	
\end{tikzpicture}}%	
\drawflag\par\medskip	
\newdimen\flaglength\flaglength=40mm	
\def\flagstretch{1}\drawflag	

By checking the macro flagvariant, which has to expand to a single digit or character, T_EX -code can be executed conditionally by use of if... else... fi. The following example demonstrates two variants of a flag:



3.3 Commands

A couple of commands for common geometric elements on flags facilitate the flag description. To avoid accidental name clashes with other packages, the visibility of those commands is confined to the environment flagdescription.

<pre>\begin{flagdescription}{{}</pre>				
\end{flagdescription}	environment for the flag with a spect ratio ξ			
Geometric flag elements:				
\framecode{path}	drawing path for the frame around the flag; if <i>path</i> is empty, a rectangular frame is drawn.			
$hstripesII{c_1}{c_2}$	partitions the flag into two horizontal stripes with the colors c_1 and c_2 .			
$hstripesIII{c_1}{c_2}{c_3}$	three horizontal stripes with the colors c_1, \ldots, c_3			
$hstripesIV{c_1}{c_2}{c_3}$	$\{c_4\}$ four horizontal stripes with the colors c_1, \ldots, c_4			
$vstripesII{c_1}{C_2}$	partitions the flag into two vertical stripes with the colors c_1 and c_2 .			
$vstripesIII{c_1}{c_2}{c_3}$	three vertical stripes with the colors c_1, \ldots, c_3			
$hbar{c}{y}{w}$	horizontal bar with the color c and the line width w at the y -coordinate y			
$vbar{c}{x}{w}$	vertical bar with the color c and the line width w at the x -coordinate x			
$\chevron{c}{x}$	isosceles triangle at the hoist with the color c and the vertex at the x -coordinate x			
$starV{c}{p}{r}{\alpha}$	5-pointed star as a compex polygon with the fill color c , an outer raduis r , an angle α at the coordinate p			
$\operatorname{Tr}{c}{p}{r}{\alpha}$	6-pointed star as a compex polygon with the fill color c , an outer raduis r , an angle α at the coordinate p			
$\texttt{starn}{c}{n}{p}{r_1}{r_2}$	$\{\alpha\}$ n-pointed star with color <i>c</i> , an outer raduis r_1 , an inner raduis r_2 and an angle α at the coordinate <i>p</i>			
$\mbox{moon}{c}{p_1}{r_1}{p_2}{r_2}$	crescent moon with the fill color c , as a difference set of two generating circles with the radii r_1 , r_2 , and cen- ter coordinates p_1 and p_2			
$\sum x_1 \{y_1\} \{y_1\} \{x_2\}$	$\{y_2\}$ Union Jack between the coordinates (x_1, y_1) and (x_2, y_2)			

The macros \hstripesII, \hstripesIII, \hstripesIV, \vstripesII, \vstripesIII partition the flag into an according number of horizontal or vertical colored stripes.

Code:	Result:
<pre>\begin{tikzpicture} \begin{flagdescription}{3/4} \hstripesIII{cyan}{white}{red} \end{flagdescription} \end{tikzpicture} \begin{tikzpicture} \begin{flagdescription}{3/4} \vstripesIII{cyan}{white}{red} \end{flagdescription} \end{tikzpicture}</pre>	

\background fills the entire rectangular area of the flag with color; note: a flag needs neither a frame around it nor a background on principle. **\hbar** draws a horizontal bar of given width and color at a specified *y*-coordinate across the flag; **\vbar** does the same vertically. **\chevron** draws an isosceles triangle with a given height over the hoist.



\unionjack draws the Union Jack (which is part of a couple of flags) between a lower left and an upper right point. Their coordinates $-x_1$, y_1 , x_2 , y_2 - are separate parameters, which *must* be specified as dimensions (i. e. using a unit), not just as numbers. The colors **blue**, **red** and **white** can be redefined arbitrarily.



The various types of stars \starV \starVI \starn and \moon are self-explanatory. In the following example \starn and \moon are overlayed with the generating circles.



4 Flags

4.1 National Flags of sovereign states

		Ø	O
Afghanistan	Albania	Algeria	Andorra
(AF)	(AL)	(DZ)	(AD)
R			
Angola	Antigua & Barbuda	Argentina	Armenia
(AO)	(AG)	(AR)	(AM)
*** ***		C*	
Australia	Austria	Azerbaijan	Bahamas
(AU)	(AT)	(AZ)	(BS)
		Ψ	
Bahrein	Bangladesh	Barbados	Belarus
(BH)	(BD)	(BB)	(BY)
			to to
Belgium	Belize	Benin	Bhutan
(BE)	(BZ)	(BJ)	(BT)
	××××××××××××××××××××××××××××××××××××××		
Bolivia	Bosnia & Herzogovina	Botswana	Brazil
(BO)	(BA)	(BW)	(BR)

		*	
Brunei	Bulgaria	Burkina Faso	Burundi
(BN)	(BG)	(BF)	(BI)
	*	*	* * * * * * *
Cambodia	Cameroon	Canada	Cape Verde
(KH)	(CM)	(CA)	(CV)
*		*	★** **
Central African Rep.	Chad	Chile	China
(CF)	(TD)	(CL)	(CN)
		*	
Colombia	Comoros	Congo, Democratic Rep.	Congo, Republic
(CO)	(KM)	(CD)	(CG)
***** * **** *****	@		
Cook Islands	Costa Rica	Croatia	Cuba
(CK)	(CR)	(HR)	(CU)
Martin and Martin			*
Cyprus	Czech Republic	Denmark	Djibouti
(CY)	(CZ)	(DK)	(DJ)
			Ŵ
Dominica	Dominican Republic	East Timor	Ecuador
(DM)	(DO)	(TL)	(EC)

		4 ⁰⁰⁰⁰ 0-	
	*		
Egypt	EL Salvador	Equatorial Guinea	Eritrea
(EG)	(SV)	(GQ)	(ER)
Estonia	Eswatini	Ethiopia	Fiji
(EE)	(SZ)	(ET)	(FJ)
Finnland (FI)	France (FR)	Gabon (GA)	Gambia (GM)
+ +		+	
+ +			
Georgia	Germany	Ghana	Greece
(GE)	(DE)	(GH)	(GR)
			*
Grenada	Guatemala	Guinea	Guinea Bissau
(GD)	(GT)	(GN)	(GW)
		* * *	
Guyana	Haiti	Honduras	Hungary
(GY)	(HT)	(HN)	(HU)
Iceland	India	Indonesia	Iran
(IS)	(IN)	(ID)	(IR)

الله اکبر		XX	
Iraq (IQ)	Ireland (IE)	Israel (IL)	Italy (IT)
			*
Ivory Coast (CI)	Jamaica (JM)	Japan (JP)	Jordan (JO)
٩			
Kazakhstan (KZ)	Kenya (KE)	Kiribati (KI)	Korea, North (KP)

Korea, South (KR)	Kosovo (KO)	Kuwait (KW)	Kyrgystan (KG)
Laos (LA)	Latvia (LV)	Lebanon (LB)	Lesotho (LS)
*	C*		
Liberia (LR)	Libya (LY)	Liechtenstein (LI)	Lithuania (LT)
Luxembourg (LU)	Madagaskar (MG)	Malawi (MW)	Malaysia (MY)

Maledives	Mali	Malta	Marshall Islands
(MV)	(ML)	(MT)	(MH)
*		٢	* *
Mauritania	Mauritius	Mexico	Micronesia
(MR)	(MU)	(MX)	(FM)
Moldova	Monaco	Mongolia	Montenegro
(MD)	(MC)	(MN)	(ME)
\bigstar	*	\rightarrow	*
Morocco	Mozambique	Myanmar	Namibia
(MA)	(MZ)	(MM)	(NA)
*	*		
Nauru	Nepal	Netherlands	New Zealsnd
(NR)	(NP)	(NL)	(NZ)
	•		
Nicaragua	Niger	Nigeria	North Macedonia
(NI)	(NE)	(NG)	(MK)
		C	
Norway	Oman	Pakistan	Palau
(NO)	(OM)	(PK)	(PW)

	*	* *	6
Palestine (PS)	Panama (PA)	* Papua New Guinea (PG)	Paraguay (PY)
	*		
Peru (PE)	Philippines (PH)	Poland (PL)	Portugal (pt)
			*
Quatar (QA)	Romania (RO)	Russia (RU)	Rwanda (RW)
XX		*	***
St. Kitts & Nevis (KN)	St. Lucia (LC)	St. Vincent (VC)	Samoa (WS)
	* *		*
San Marino (SM)	Sao Tome & Principe (ST)	Saudi Arabia (SA)	Senegal (SN)
			(***
Serbia (RS)	Seychelles (SC)	Sierra Leone (SL)	Singapore (SG)
+		***	*
Slovakia (SK)	Slovenia (SI)	Solomon Islands (SB)	Somalia (SO)

	* >		
South Africa (ZA)	South Sudan (SS)	Spain (ES)	Sri Lanka (LK)
	*		+
Sudan (SD)	Suriname (SR)	Sweden (SE)	Switzerland (CH)
* *	*	****	
Syria	Taiwan	Tajikistan	Tanzania
(SY)	(TW)	(TJ)	(TZ)
	*	+	
Thailand (TH)	Togo (TG)	Tonga (TO)	Trinidad & Tobago (TT)
(3	C*		
Tunisia	Turkey	Turkmenistan	Tuvalu
(TN)	(TR)	(TM)	(TV)
Uganda (UG)	Ukraine (UA)	United Arab Emirates (AE)	United Kingdom (GB)
	*		9
United States	Uruguay	Uzbekistan	Vanuatu
(IIS)	(IIV)	$(\mathbf{I}\mathbf{I}\mathbf{Z})$	

(UY)

(US)

Vanuatu (VU)

(UZ)



Austria: Variant 0 (AT) (AT)

4.2 Historical and outdated flags



4.3 Flags of other countries and territories



Greenland	Guernsey	Isle of Man	Jersey
(GL)	(GG)	(IM)	(JE)
	*		
Niue	Puerto Rico	Reunion	St. Eustasius
(NU)	(PR)	(RE)	(StEustasius)
激災別期★		× ×	*
Somaliland	Tibet	Transnistria	Western Sahara
(Somaliland)	(Tibet)	(Transnistria)	(EH)

4.4 Austrian federal states

Burgenland (AT-B)

\mathbf{v}	7		
Vienna (AT-W)	Lower Austria (AT-N)	Upper Austria (AT-O)	Salzburg (AT-S)
The Tyrol (AT-T)	Vorarlberg (AT-V)	Carinthia (AT-K)	Styria (AT-St)

4.5 Italian Regions



Variants



Veneto: Variant 0 (IT-VE)



Veneto: Variant 1 (IT-VE)



Veneto: Variant 2 (IT-VE)



Veneto: Variant 3 (IT-VE)



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Rainbow flag (Rainbow) Esperanto Movement

(Esperanto)

4.7 Nautical Signal Flags

(A)	(B)	(C)	(D)	(E)
(F)	(G)	(H)	(I)	(J)
		\mathbf{X}		
(K)	(L)	(M)	(N)	(0)
(P)	(Q)	(R)	(S)	(T)
	X	-		
(U)	(V)	(W)	(X)	(Y)
(Z)				
(0)	(1)	(2)	(3)	(4)
(5)	(6)	(7)	(8)	(9)

5 Links

- [1] http://www.vexilla-mundi.com: Comprehensive website with flags of all nations including construction sheets, historical flags, flags of many cities and regions.
- [2] https://www.fotw.info: Website of the FOTW ("Flags Of The World"), vexillological association and internet resource; many background informations about flags and vexillology.
- [3] https://www.flags.net: World Flags Database; another comprehensive collection of flags from all over the world.
- [4] https://www.welt-flaggen.de: Flags of and information about all countries of the world; contains flag quizzes.
- [5] https://www.nationalflaggen.de: Provides various images and animated gifs of all national flags.