

Vect package

Vector notation with TikZ

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<https://github.com/sammaddens/vect>

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Abstract

The vect package provides an improved vector notation by involving *TikZ*.

Warning! The package is in a testing phase, so large changes are possible.

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1 Introduction

The `vec` command gives a vector with the arrow notation, but it isn't designed for multiple characters. This package provides an improved vector notation by involving *TikZ*. Additional, the kind of notation (arrow or bold) can easily be changed.

2 Usage

Load the package with:

```
\usepackage[<options>]{vect}
```

2.1 Package options

The package uses by default the improved vector notation when the `vec` command is called. The first two package options can change this behaviour.

- `vecb`: Bold and upright vector notation without arrow.
- `oldvec`: Preserve the original `vec` command.
- `frame`: Put a frame around the node and arrow when the improved vector notation is used (see section 2.4.1).

Multiple options can be called by separating them with a comma:

```
\usepackage[vecb, frame]{vect}
```

2.2 Basic usage

Some basic commands are provided for a straightforward use.

- `\vec{<arg>}`: Improved vector notation by default, depends on chosen package option.
- `\vect{<arg>}`: Improved vector notation.

`\vect{AB}` \overrightarrow{AB}

- `\vecb{<arg>}`: Bold and upright vector notation without arrow.

`\vecb{AB}` **AB**

- `\oldvec{<arg>}`: Original vector notation.

`\oldvec{AB}` \vec{AB}

Some examples illustrate the improved vector notation.

`\vec{x}` \vec{x}

`$\vec{AB_1}$` $\overrightarrow{AB_1}$

`$\vec{A_1B}$` $\overrightarrow{A_1B}$

`$\vec{A_1B_1}$` $\overrightarrow{A_1B_1}$

2.3 Index

For properly indexing a vector, each basic command has an optional argument **after** the main argument (made possible by the `xparse` package).

- `\vec{<arg>}[<arg>]`: \vec{r}_{1x}
- `\vect{<arg>}[<arg>]`: \vec{r}_{1x}
- `\vecb{<arg>}[<arg>]`: \mathbf{r}_{1x}
- `\oldvec{<arg>}[<arg>]`: \vec{r}_{1x}

2.4 Advanced usage

A more advanced usage can be achieved with the comma separated options (key values) in the optional argument **before** the main argument:

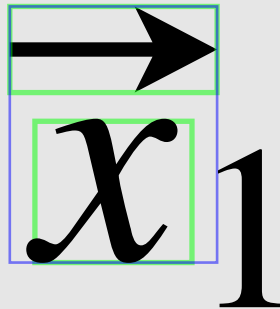
`\vec[<options>]{<arg>}` or `\vect[<options>]{<arg>}`

The optional argument is also compatible with the other basic commands, but without effects.

2.4.1 Frame

The option `frame` puts a frame around the node and arrow. This is helpful for fine tuning spacing. `frame` can also be used as a package option.

\vec{x}_1



2.4.2 Spacing

Warning! These options can be removed in the future.

The following options add space around the arrow:

- `left = <dim>`: $x \vec{x}_1 x$
- `right = <dim>`: $x \vec{x}_1 x$

3 Comparison with other packages

3.1 Esvect

The `esvect` package¹ is an alternative for an improved vector notation. It's based on playing with the combination of connected lines and the arrow head. The result of the `vect` package is similar, but the largest differences are:

- The rendering is smooth for all zooming factors.
`esvect` gives an overlap in the arrow which is visible for some zooming factors. This is caused by the used method.
- The index is an optional argument after the base command.
`esvect` needs the starred version to add an index.
- The last index is placed correctly.
`esvect` introduces an extra space before the last index.
- Currently, only one type of arrow head is supported.
`esvect` provides 8 options.

Some examples help to compare the two packages.

Arrow

<code>vect</code>	<code>\vec{x}</code>	<code>\vec{x}</code>	<code>vect</code>	<code>$\vec{\imath}$</code>	<code>$\vec{\imath}$</code>
<code>esvect</code>	<code>\vec{x}</code>	<code>\vec{x}</code>	<code>esvect</code>	<code>$\vec{\imath}$</code>	<code>$\vec{\imath}$</code>
<code>vect</code>	<code>\vec{AB}</code>	<code>\vec{AB}</code>			
<code>esvect</code>	<code>\vec{AB}</code>	<code>\vec{AB}</code>			

Index

<code>vect</code>	<code>$\vec{a_{ix}}$</code>	<code>$\vec{a_{ix}}$</code>	<code>vect</code>	<code>$\vec{a_{ix}}$</code>	<code>$\vec{a_{ix}}$</code>
<code>esvect</code>	<code>$\vec{a_{ix}}$</code>	<code>$\vec{a_{ix}}$</code>	<code>esvect</code>	<code>$\vec{a_{ix}}$</code>	<code>$\vec{a_{ix}}$</code>

Size

<code>vect</code>	<code>$\vec{E}_{\vec{E}_{\vec{E}}}$</code>	<code>$\vec{E}_{\vec{E}_{\vec{E}}}$</code>
<code>esvect</code>	<code>$\vec{E}_{\vec{E}_{\vec{E}}}$</code>	<code>$\vec{E}_{\vec{E}_{\vec{E}}}$</code>
<code>vect</code>	<code>$\vec{E}^{\vec{E}^{\vec{E}}}$</code>	<code>$\vec{E}^{\vec{E}^{\vec{E}}}$</code>
<code>esvect</code>	<code>$\vec{E}^{\vec{E}^{\vec{E}}}$</code>	<code>$\vec{E}^{\vec{E}^{\vec{E}}}$</code>
<code>vect</code>	<code>$\vec{\mathcal{X}}$</code>	<code>$\vec{\mathcal{X}}$</code>
<code>esvect</code>	<code>$\vec{\mathcal{X}}$</code>	<code>$\vec{\mathcal{X}}$</code>

¹<https://www.ctan.org/pkg/esvect>, maintained by Eddie Soudrais

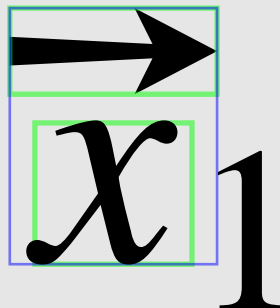
3.2 Letterswitharrows

Another package for vectors is `letterswitharrows`², but its focus lies on single characters.

4 Hacking the code

Use the following code in the preamble if you want to change the arrow.

```
\makeatletter
\renewcommand{\arrowpath@vect}{%
  \fill
  % Top
  ($ (node@vect.north west) + (0pt - 0.5*\extraWidthMain@vect,\vOffset@vect + 1*\linewidth@vect)$)
  -- ($ (node@vect.north east) + (-4.5*\linewidth@vect + 0.5*\extraWidthMain@vect,\vOffset@vect + 0.5*\linewidth@vect)$)
  -- ($ (node@vect.north east) + (-4.5*\linewidth@vect + 0.5*\extraWidthMain@vect,\vOffset@vect + 0.5*\linewidth@vect) +
    (-1.25*\linewidth@vect,2.5*\linewidth@vect)$)
  % Middle
  -- ($ (node@vect.north east) + (0pt + 0.5*\extraWidthMain@vect,\vOffset@vect)$)
  % Bottom
  -- ($ (node@vect.north east) + (-4.5*\linewidth@vect + 0.5*\extraWidthMain@vect,\vOffset@vect - 0.5*\linewidth@vect) +
    (-1.25*\linewidth@vect,-2.5*\linewidth@vect)$)
  -- ($ (node@vect.north east) + (-4.5*\linewidth@vect + 0.5*\extraWidthMain@vect,\vOffset@vect - 0.5*\linewidth@vect)$)
  -- ($ (node@vect.north west) + (0pt - 0.5*\extraWidthMain@vect,\vOffset@vect - 1*\linewidth@vect)$)
  % Close
  -- cycle;%
}
\makeatother
```



²<https://www.ctan.org/pkg/letterswitharrows>, maintained by Max Teegen

5 Improvement

Bugs or suggestions for improvement can be reported at the related GitHub page or by email:

- <https://github.com/sammaddens/vect>
- samdotm28atoutlookdotcom

6 History log

Version 0.1.0 (2020/12/27)

- Search for last index removed.
- Code extended.

Version 0.0.1 (2020/03/29)

- Code clarified and extended.

Version 0.0.0 (2019/07/25)

- Initial version.