Using plugins to insert technical figures

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1. \texttt{TEXMACS} plugins
• **Computer Algebra system**

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• **Numerical Computations Software**

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- **Drawing Programs**

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<td>dratex</td>
<td>Drawing different types of charts and diagrams</td>
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<td>xypic</td>
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2. \texttt{DraTeX}/\texttt{AlDraTeX}

- \texttt{DraTeX} provides commands for drawing basic shapes like lines, rectangles, and Bezier curves, and for defining utilities that produce more complex outcomes.

- \texttt{AlDraTeX} provides templates for drawing different types of charts and diagrams.

\texttt{TeXmacs interface to (Al)DraTex (High Level Drawing Facilities)}

\begin{verbatim}
DraTex] \Draw
   \Tree()
   2,atom     //
   0,electrons & 2,nucleus //
   0,protons & 0,neutrons //)
\EndDraw

atom
\hspace{1cm}
\begin{tikzpicture}
    \node {atom} [grow=up, anchor=north, align=center]
        child {node {electrons}}
        child {node {nucleus}
            child {node {protons}}
            child {node {neutrons}}
        };
\end{tikzpicture}
\end{verbatim}

DraTex]
\Draw
\TreeAlign(H,0,0)(0,0,0)
\TreeSpace(S,5,15)
\Tree()
2,European //
3,Latin & 2,Celtic //
0,French & 0,Italian & 0,Spanish & 0,Irish & 0,Welsh //
\EndDraw

\Tree
  European
    Latin
    French
    Italian
    Spanish
  Celtic
    Irish
    Welsh

DraTex]
3. Gnuplot

- Gnuplot is a portable command-line driven interactive data and function plotting utility. Gnuplot supports many types of plots in either 2D and 3D. It can draw using lines, points, boxes, contours, vector fields, surfaces, and various associated text. It also supports various specialized plot types.

This is a TeXmacs interface for GNUplot.

GNUplot] plot [-3.14:3.14] sin(x)
4. Graphviz

- Graph visualization is a way of representing structural information as diagrams of abstract graphs and networks.

- Graphviz is an automatic graph visualization software. The Graphviz layout programs take descriptions of graphs in a simple text language, and make diagrams in several useful formats such as Postscript for inclusion in \TeX\textsc{macs}.

Welcome to a simple \TeX\textsc{macs} interface to Graphviz/dot
(C) 2002 Jorik Blaas and Joris van der Hoeven

Graphviz 1] digraph G {
    main -> parse -> execute;
    main -> init;
    main -> cleanup;
    execute -> make_string;
    execute -> printf;
    init -> make_string;
    main -> printf;
    execute -> compare;
}
Graphviz 2]
digraph g {
  node [shape = record, height = 0.1];
  node0[label = "<f0> | <f1> G | <f2> "];
  node1[label = "<f0> | <f1> E | <f2> "];
  node2[label = "<f0> | <f1> B | <f2> "];
  node3[label = "<f0> | <f1> F | <f2> "];
  node4[label = "<f0> | <f1> R | <f2> "];
  node5[label = "<f0> | <f1> H | <f2> "];
  node6[label = "<f0> | <f1> Y | <f2> "];
  node7[label = "<f0> | <f1> A | <f2> "];
  node8[label = "<f0> | <f1> C | <f2> "];
  "node0":f2 -> "node4":f1;
  "node0":f0 -> "node1":f1;
  "node1":f0 -> "node2":f1;
  "node1":f2 -> "node3":f1;
  "node2":f2 -> "node8":f1;
  "node2":f0 -> "node7":f1;
  "node4":f2 -> "node6":f1;
  "node4":f0 -> "node5":f1;
}
Graphviz 4]
5. Xy-pic

- xypic is a package for typesetting “matrix like” diagrams, such as commutative diagrams. In category theory, “commutative diagrams” are the categorists ways to illustrate equations and universal properties.

TeXmacs interface to XYpic (high level 2-dimensional graphics)

```
xymatrix{ 
  U \ar@/_/[ddr]_y \ar@/^/[drr]^x \ar@{>}[dr]|-{(x,y)} \ar@{.>}[dr]|- \ar@{=} \ar@{-}[dr]|- \\
  & X \ar[r]_d \times \ar[r]_q \ar[r]_p & X \ar[d]_f & & \\
  & Y \ar[r]_q & X \ar[r]_g & Z 
}
```
\[X_{\theta_1(\theta)} \xrightarrow{\gamma} X_{\theta_2(\theta)}\]

\[\prod_{\theta \in \mathcal{C}_1} X_{\theta_1, \theta} \approx \mathcal{C}_1 \times_{\mathcal{C}_0} X \xrightarrow{\gamma} X\]

\[\text{pr}_1 = d_1^*\]

\[C_1 \xrightarrow{d_0} C_0\]