codeanatomy – Draw Code Anatomy*

Usage

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1 Introduction

The idea of this Package is to typeset illustrations of pieces of code with annotations on each single parts of code (Code Anatomy). The origin of this idea is code illustrations in the textbook [1]. This package just provides tool to draw those figures.

2 Tutorial

In this tutorial we will draw an anatomy of a function like the figure 1 step by step.

2.1 Package Usage

To use this package, just insert \usepackage{codeanatomy} in your \LaTeX file.

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2.2 Create an anatomy environment

Next step is to create a \texttt{tikzpicture} environment. All commands in this package must be placed in a \texttt{tikzpicture} environment with option \texttt{remember picture}.

\begin{tikzpicture}[\remember picture]
\begin{scope}[on background layer]
\draw[code grid debug] (-0.5,-0.5) grid (6.5,4.5);
\end{scope}
\end{tikzpicture}

\section*{2.3 Typeset Code Listing in a TikZ-Node}

As next step we need to put the piece of code in the \texttt{tikzpicture} environment using the command \texttt{\textbackslash codeBlock}.

\begin{tikzpicture}[\remember picture]
\begin{scope}[on background layer]
\draw[code grid debug] (-0.5,-0.5) grid (6.5,4.5);
\end{scope}
\codeBlock{\%
function gcd(p, q) {
  if (q === 0) {
    return p;
  } else {
    return gcd(q, p % q);
  }
}
\end{tikzpicture}

The result of the above code is shown in the figure 2, which is not what we really want. All extra whitespaces and newlines in the listing are removed, further more \{ and \} are interpreted as \LaTeX\ tokens and are not displayed.

We need to put \texttt{\ptab} and \texttt{\\} into code to keep whitespaces and newlines. The characters \{ and \} also need to be escaped by prefixing a \textbackslash before them.
function gcd(p, q) if (q === 0) return p; else return gcd(q, p%q);

The result (figure 3) is much more like what we expect than the version before (figure 2).
2.4 Mark Parts of Code

Now we can mark interesting parts of code with a blue boxes created by \cPart. At some positions we can use \[\langle \text{length} \rangle \] to add a little amount of vertical space, so that the boxes do not touch each others.

\begin{tikzpicture}[remember picture]
{[on background layer]\draw[code grid debug]
(-0.5,-0.5) grid (6.5,4.5);}
\codeBlock{
\cPart{functionHead}{function\cPart{functionName}{gcd} \cPart{paramList}{(p, q)}} \{
\[2.5pt\]
\ptab{}\mtPoint{mostLeft}if (q === 0) \{ \ \\\ \\\\ \\\\ \\\}\ptab \ptab\\\\\\\\\\\\\\\\\\\\mbPoint{mostBottom}\
\}\\\\
\{ \ \\\\\\\\\\\\\\\\\\\\extremPoint{mostRight} | \\ \\\\\\\\\\\\\\\\\\\mbPoint{mostRight} | \\}
}\fitExtrem{functionBody}{(mostLeft) (mostRight) (mostBottom)}
\end{tikzpicture}

\texttt{cPart} can be nested

\begin{figure}[h]
\centering
\input{example.tex}
\caption{Function with marked parts}
\end{figure}

2.5 Create Annotation Labels

We can use \codeAnnotation to create annotation labels for each parts of code. To draw an arrow from label to a code part we can use the Ti\textit{kZ}command \draw[-, annotation] \((\langle \text{annotation label} \rangle) -- (\langle \text{code part} \rangle)\). Whereas \((\langle \text{annotation label} \rangle)\)'s are the first argument of \codeAnnotations and \((\langle \text{code part} \rangle)\)'s are the first argument of \cParts.
Instead of operator -- we can use operator to \texttt{[(TikZ options)]} to draw a path from \texttt{(annotation label)} to \texttt{(code part)}. Finally we can remove the command \texttt{\draw[code grid debug]}... at the begin of the \texttt{tikzpicture}. The final result is shown in the figure 5, which is almost the same as figure 1.

![Figure 5: Function with Annotation Labels](image-url)
3 Usage in conjunction with listings

As we see in the previous section, the command \codeBlock cannot typeset whitespaces correctly as we expect. A way to typeset code listing is using the package listings. See codeanatomy.lstlisting.pdf

4 Customize style

TODO
References