1918-108-C1-W10-01

Anna Bogachova

April 2019

- The sigmoid function (or logistic)

$$\phi(x) = \frac{1}{1+\exp(-x)}.$$

- The hyperbolic tangent function ("tanh")

$$\phi(x) = \frac{\exp(x)-\exp(-x)}{\exp(x)+\exp(-x)} = \frac{\exp(2x)-1}{\exp(2x)+1}.$$

- The hard threshold function

$$\phi_\beta(x) = \mathbf{1}_{x\geq\beta}.$$

- The Rectified Linear Unit (ReLU) activation function

$$\phi(x) = \max(0, x).$$

Here is a schematic representation of an artificial neuron where $\Sigma = \langle w_j, x\rangle + b_j$.

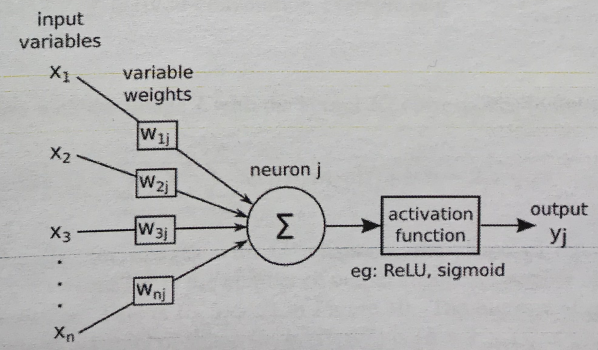

Figure 1: source: andrewjames turner.co.uk

The Figure 2 represents the activation function described above.

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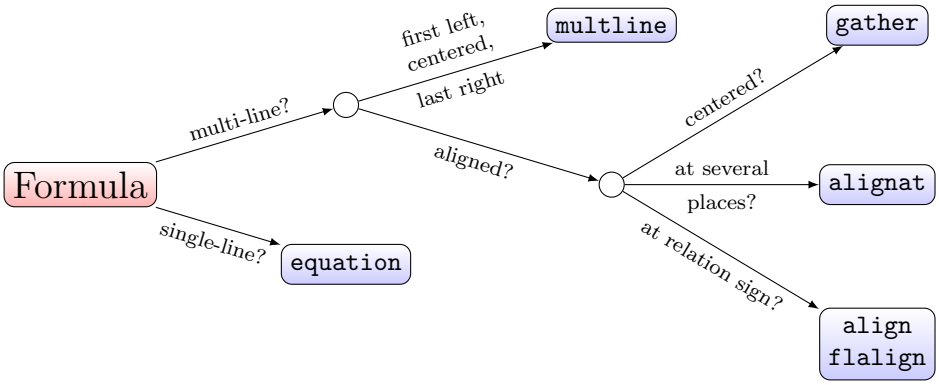

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```
 \documentclass{article}
\usepackage[utf8]{inputenc}
\usepackage{graphicx}
\usepackage{tikz}
\usetikzlibrary{positioning,shadows,arrows}
\tikzset{
  treenode/.style = {shape=rectangle, rounded corners,
                     draw, align=center,
                     top color=white, bottom color=blue!20},
  root/.style     = {treenode, font=\Large, bottom color=red!30},
  env/.style      = {treenode, font=\ttfamily\normalsize},
  dummy/.style    = {circle,draw}
}

\title{1918-108-C1-W10-01}
\author{Anna Bogachova }
\date{April 2019}


\begin{document}
\maketitle

\includegraphics[width=\textwidth]{Lapa1.jpg}

\pagebreak

\begin{itemize}
    \item The sigmoid function (or logistic)

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\end{itemize}

Here is a schematic representation of an artificial neuron where $\Sigma = \langle w_j, x \r

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

\begin{tikzpicture}
  [
    grow                    = right,
    sibling distance        = 6em,
```

```
    level distance          = 10em,
    edge from parent/.style = {draw, -latex},
    every node/.style       = {font=\footnotesize},
    sloped
  ]
  \node [root] {Formula}
    child { node [env] {equation}
      edge from parent node [below] {single-line?} }
    child { node [dummy] {}
      child { node [dummy] {}
        child { node [env] {align\\flalign}
          edge from parent node [below] {at relation sign?} }
        child { node [env] {alignat}
          edge from parent node [above] {at several}
                           node [below] {places?} }
        child { node [env] {gather}
                edge from parent node [above] {centered?} }
        edge from parent node [below] {aligned?} }
      child { node [env] {multline}
              edge from parent node [above, align=center]
                {first left,\\centered,}
              node [below] {last right}}
              edge from parent node [above] {multi-line?} };
\end{tikzpicture}
\begin{center}
 Figure 1: source: andrewjames turnmer.co.uk
\end{center}

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```