

1819-108-W10-C1-HW

Jānis Konopackis

8 April 2019

Example :

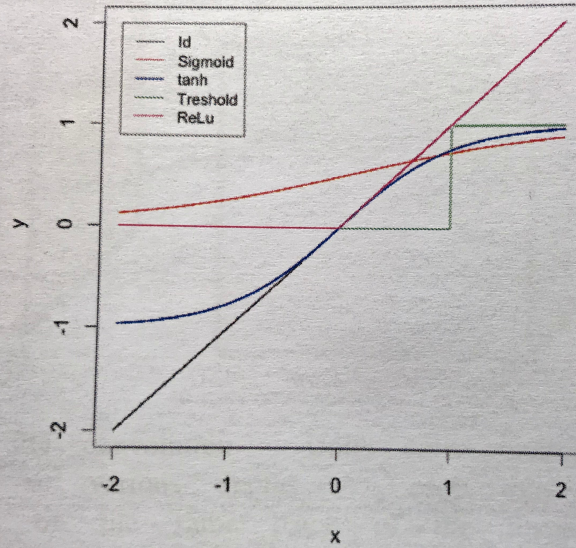
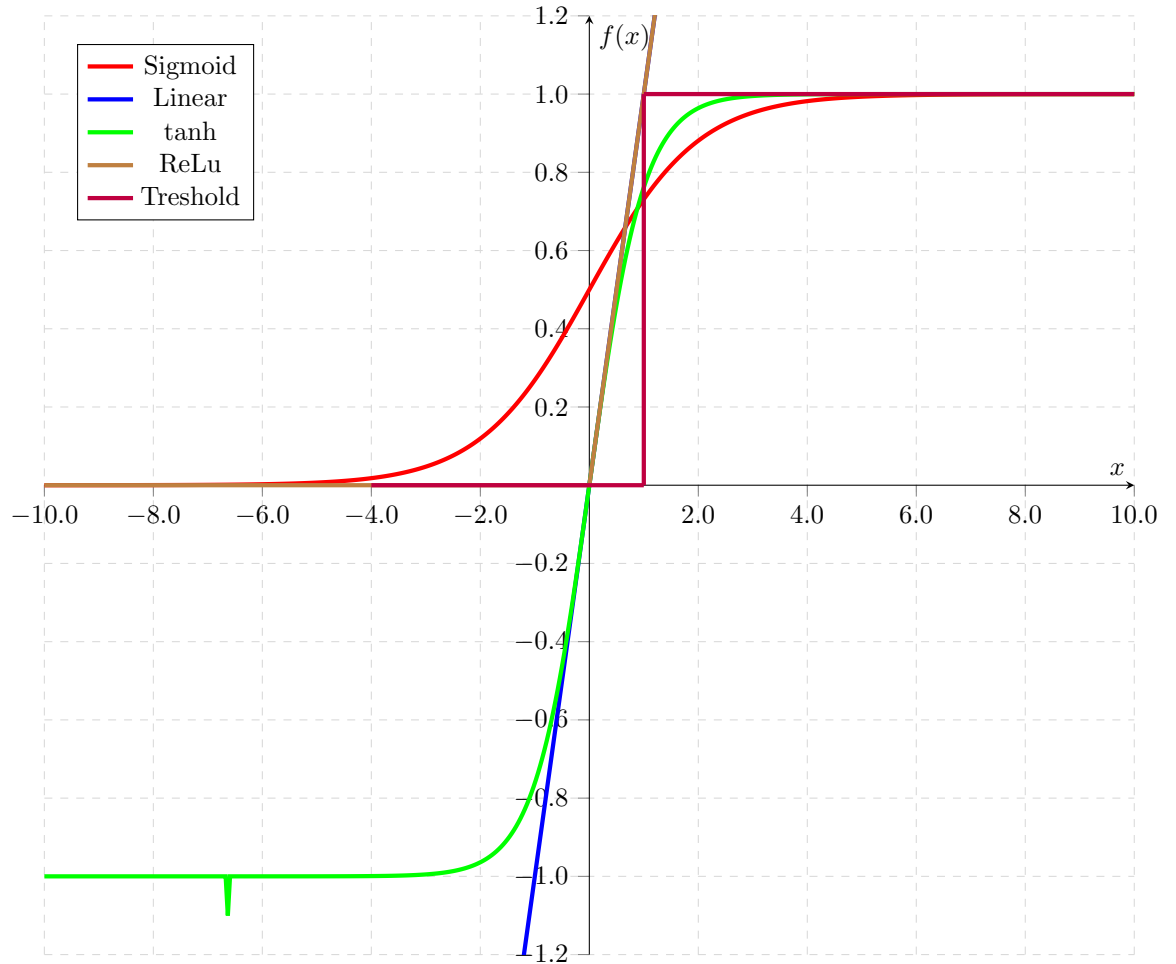


Figure 2: Activation functions

Math formulas for given activation functions:

- Sigmoid: $f(x) = \frac{1}{1+e^{-x}}$
- tanh : $f(x) = \tanh(x) = \frac{2}{1+e^{-2x}} - 1$
- ReLu : $f(x) = \begin{cases} 0 & \text{for } x < 0 \\ x & \text{for } x \geq 0 \end{cases}$
- Linear : $f(x) = x$
- Treshold : $f(x) = \begin{cases} 0 & \text{for } x < 0 \\ 1 & \text{for } x \geq 0 \end{cases}$

Tikzpicture :



```

\documentclass{report}
\usepackage[utf8]{inputenc}
\usepackage{pgfplots}
\usepackage{tikz}
\usepackage{enumitem}
\usepackage{amsmath}
\usepackage{graphicx}
\usepackage{verbatim}
\usepackage{setspace}

\title{1819-108-W10-C1-HW}
\author{Jānis Konopackis }
\date{8 April 2019}

\begin{document}

\maketitle

\newpage
Example :\\
\includegraphics[scale=0.1]{1.jpg}
\newpage
Math formulas for given activation functions:
\begin{itemize}
\item Sigmoid:  $f(x) = \frac{1}{1 + e^{-x}}$ 
\item tanh :  $f(x) = \tanh(x) = \frac{2}{1 + e^{-2x}} - 1$ 
\item ReLu :  $f(x) = \begin{cases} 0 & \text{for } x < 0 \\ x & \text{for } x \geq 0 \end{cases}$ 
\item Linear :  $f(x) = x$ 
\item Treshold :  $f(x) = \begin{cases} 0 & \text{for } x < 0 \\ 1 & \text{for } x \geq 0 \end{cases}$ 
\end{itemize}

Tikzpicture :

\begin{tikzpicture}
\centering
\begin{axis}[
legend pos=north west,
axis x line=middle,
axis y line=middle,
x tick label style={/pgf/number format/fixed,
/pgf/number format/fixed zerofill,
/pgf/number format/precision=1},
y tick label style={/pgf/number format/fixed,
/pgf/number format/fixed zerofill,

```

```

/pgf/number format/precision=1},

grid = major,
width=16cm,
height=14cm,
grid style={dashed, gray!30},
xmin=-10,
xmax= 10,
ymin= -1.2,
ymax= 1.2,
xlabel=$x$,
ylabel=$f(x)$,
tick align=outside,
enlargeticks=false]

\addplot[domain=-10:10, red, ultra thick, samples=500] {1/(1+exp(-x))};
\addlegendentry{Sigmoid}
\addplot[domain=-10:10, blue, ultra thick, samples=500]{x};
\addlegendentry{Linear}
\addplot[domain=-10:10, green, ultra thick, samples=500] {tanh(x)};
\addlegendentry{tanh}
\addplot[domain=-10:0, brown, ultra thick, samples =500] {0};
\addplot[domain=0:10, brown, ultra thick, samples =500, forget plot] {x};
\addlegendentry{ReLU}
\addplot[domain=-4:1, purple, ultra thick, samples =500] {0};
\addplot[domain=1:10, purple, ultra thick, samples =500] {1};
\addplot[purple, ultra thick] coordinates {(1,1) (1,0)};
\addlegendentry{Threshold}
\end{axis}
\end{tikzpicture}
\newpage

```