

```

\documentclass[11pt]{article}

\usepackage[breakable]{tcolorbox}
\usepackage{parskip} % Stop auto-indenting (to mimic markdown behaviour)

\usepackage{iftex}
\ifPDFTeX
  \usepackage[T1]{fontenc}
  \usepackage{mathpazo}
\else
  \usepackage{fontspec}
\fi

% Basic figure setup, for now with no caption control since it's done
% automatically by Pandoc (which extracts  syntax from Markdown).
\usepackage{graphicx}
% Maintain compatibility with old templates. Remove in nbconvert 6.0
\let\Oldincludegraphics\includegraphics
% Ensure that by default, figures have no caption (until we provide a
% proper Figure object with a Caption API and a way to capture that
% in the conversion process - todo).
\usepackage{caption}
\DeclareCaptionFormat{nocaption}{}
\captionsetup{format=nocaption,aboveskip=0pt,belowskip=0pt}

\usepackage[Export]{adjustbox} % Used to constrain images to a maximum size
\adjustboxset{max size={0.9\linewidth}{0.9\paperheight}}
\usepackage{float}
\floatplacement{figure}{H} % forces figures to be placed at the correct location
\usepackage{xcolor} % Allow colors to be defined
\usepackage{enumerate} % Needed for markdown enumerations to work
\usepackage{geometry} % Used to adjust the document margins
\usepackage{amsmath} % Equations
\usepackage{amssymb} % Equations
\usepackage{textcomp} % defines textquotesingle
% Hack from http://tex.stackexchange.com/a/47451/13684:
\AtBeginDocument{%
  \def\PYZsq{\textquotesingle}% Upright quotes in Pygmentized code
}
\usepackage{upquote} % Upright quotes for verbatim code
\usepackage{eurosym} % defines \euro
\usepackage[mathletters]{ucs} % Extended unicode (utf-8) support
\usepackage{fancyvrb} % verbatim replacement that allows latex
\usepackage{grffile} % extends the file name processing of package graphics
% to support a larger range
\makeatletter % fix for grffile with XeLaTeX
\def\Gread@ @xetex#1{%
  \IfFileExists{"\Gin@base".bb}%

```

```

{\Gread@eps{\Gin@base.bb}}}%
{\Gread@@@xetex@aux#1}%
}
\makeatother

```

```

% The hyperref package gives us a pdf with properly built
% internal navigation ('pdf bookmarks' for the table of contents,
% internal cross-reference links, web links for URLs, etc.)
\usepackage{hyperref}
% The default LaTeX title has an obnoxious amount of whitespace. By default,
% titling removes some of it. It also provides customization options.
\usepackage{titling}
\usepackage{longtable} % longtable support required by pandoc >1.10
\usepackage{booktabs} % table support for pandoc > 1.12.2
\usepackage[inline]{enumitem} % lRkernel/repr support (it uses the enumerate* environment)
\usepackage[normalem]{ulem} % ulem is needed to support strikethroughs (\sout)
% normalem makes italics be italics, not underlines
\usepackage{mathrsfs}

```

```

% Colors for the hyperref package
\definecolor{urlcolor}{rgb}{0,.145,.698}
\definecolor{linkcolor}{rgb}{.71,0.21,0.01}
\definecolor{citecolor}{rgb}{.12,.54,.11}

```

```

% ANSI colors
\definecolor{ansi-black}{HTML}{3E424D}
\definecolor{ansi-black-intense}{HTML}{282C36}
\definecolor{ansi-red}{HTML}{E75C58}
\definecolor{ansi-red-intense}{HTML}{B22B31}
\definecolor{ansi-green}{HTML}{00A250}
\definecolor{ansi-green-intense}{HTML}{007427}
\definecolor{ansi-yellow}{HTML}{DDB62B}
\definecolor{ansi-yellow-intense}{HTML}{B27D12}
\definecolor{ansi-blue}{HTML}{208FFB}
\definecolor{ansi-blue-intense}{HTML}{0065CA}
\definecolor{ansi-magenta}{HTML}{D160C4}
\definecolor{ansi-magenta-intense}{HTML}{A03196}
\definecolor{ansi-cyan}{HTML}{60C6C8}
\definecolor{ansi-cyan-intense}{HTML}{258F8F}
\definecolor{ansi-white}{HTML}{C5C1B4}
\definecolor{ansi-white-intense}{HTML}{A1A6B2}
\definecolor{ansi-default-inverse-fg}{HTML}{FFFFFF}
\definecolor{ansi-default-inverse-bg}{HTML}{000000}

```

```

% commands and environments needed by pandoc snippets
% extracted from the output of `pandoc -s`

```

```

\providecommand{\tightlist}{%
  \setlength{\itemsep}{0pt}\setlength{\parskip}{0pt}}
\DefineVerbatimEnvironment{Highlighting}{Verbatim}{commandchars=\\{\}}
% Add 'fontsize=\small' for more characters per line
\newenvironment{Shaded}{}{}
\newcommand{\KeywordTok}[1]{\textcolor{rgb}{0.00,0.44,0.13}\textbf{{#1}}}}
\newcommand{\DataTypeTok}[1]{\textcolor{rgb}{0.56,0.13,0.00}{{#1}}}
\newcommand{\DecValTok}[1]{\textcolor{rgb}{0.25,0.63,0.44}{{#1}}}
\newcommand{\BaseNTok}[1]{\textcolor{rgb}{0.25,0.63,0.44}{{#1}}}
\newcommand{\FloatTok}[1]{\textcolor{rgb}{0.25,0.63,0.44}{{#1}}}
\newcommand{\CharTok}[1]{\textcolor{rgb}{0.25,0.44,0.63}{{#1}}}
\newcommand{\StringTok}[1]{\textcolor{rgb}{0.25,0.44,0.63}{{#1}}}
\newcommand{\CommentTok}[1]{\textcolor{rgb}{0.38,0.63,0.69}\textit{{#1}}}}
\newcommand{\OtherTok}[1]{\textcolor{rgb}{0.00,0.44,0.13}{{#1}}}
\newcommand{\AlertTok}[1]{\textcolor{rgb}{1.00,0.00,0.00}\textbf{{#1}}}}
\newcommand{\FunctionTok}[1]{\textcolor{rgb}{0.02,0.16,0.49}{{#1}}}
\newcommand{\RegionMarkerTok}[1]{{#1}}
\newcommand{\ErrorTok}[1]{\textcolor{rgb}{1.00,0.00,0.00}\textbf{{#1}}}}
\newcommand{\NormalTok}[1]{{#1}}

% Additional commands for more recent versions of Pandoc
\newcommand{\ConstantTok}[1]{\textcolor{rgb}{0.53,0.00,0.00}{{#1}}}
\newcommand{\SpecialCharTok}[1]{\textcolor{rgb}{0.25,0.44,0.63}{{#1}}}
\newcommand{\VerbatimStringTok}[1]{\textcolor{rgb}{0.25,0.44,0.63}{{#1}}}
\newcommand{\SpecialStringTok}[1]{\textcolor{rgb}{0.73,0.40,0.53}{{#1}}}
\newcommand{\ImportTok}[1]{{#1}}
\newcommand{\DocumentationTok}[1]{\textcolor{rgb}{0.73,0.13,0.13}\textit{{#1}}}}
\newcommand{\AnnotationTok}[1]{\textcolor{rgb}{0.38,0.63,0.69}\textbf{\textit{{#1}}}}}
\newcommand{\CommentVarTok}[1]{\textcolor{rgb}{0.38,0.63,0.69}\textbf{\textit{{#1}}}}}
\newcommand{\VariableTok}[1]{\textcolor{rgb}{0.10,0.09,0.49}{{#1}}}
\newcommand{\ControlFlowTok}[1]{\textcolor{rgb}{0.00,0.44,0.13}\textbf{{#1}}}}
\newcommand{\OperatorTok}[1]{\textcolor{rgb}{0.40,0.40,0.40}{{#1}}}
\newcommand{\BuiltInTok}[1]{{#1}}
\newcommand{\ExtensionTok}[1]{{#1}}
\newcommand{\PreprocessorTok}[1]{\textcolor{rgb}{0.74,0.48,0.00}{{#1}}}
\newcommand{\AttributeTok}[1]{\textcolor{rgb}{0.49,0.56,0.16}{{#1}}}
\newcommand{\InformationTok}[1]{\textcolor{rgb}{0.38,0.63,0.69}\textbf{\textit{{#1}}}}}
\newcommand{\WarningTok}[1]{\textcolor{rgb}{0.38,0.63,0.69}\textbf{\textit{{#1}}}}}

% Define a nice break command that doesn't care if a line doesn't already
% exist.
\def\br{\hspace*{\fill}} \* }
% Math Jax compatibility definitions
\def\gt{>}
\def\lt{<}
\let\Oldtex\TeX
\let\Oldlatex\LaTeX

```

```

\renewcommand{\TeX}{\textrm{\Oldtex}}
\renewcommand{\LaTeX}{\textrm{\Oldlatex}}
% Document parameters
% Document title
\title{Datascience\_Capstone\_Project\_Report}

```

% Pygments definitions

\makeatletter

\def\PY@reset{\let\PY@it=\relax \let\PY@bf=\relax%

\let\PY@ul=\relax \let\PY@tc=\relax%

\let\PY@bc=\relax \let\PY@ff=\relax}

\def\PY@tok#1{\csname PY@tok@#1\endcsname}

\def\PY@toks#1+{\ifx\relax#1\empty\else%

\PY@tok{#1}\expandafter\PY@toks\fi}

\def\PY@do#1{\PY@bc{\PY@tc{\PY@ul{%

\PY@it{\PY@bf{\PY@ff{#1}}}}}

\def\PY#1#2{\PY@reset\PY@toks#1+\relax+\PY@do{#2}}

\expandafter\def\csname PY@tok@w\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.73,0.73}{##1}}}

\expandafter\def\csname PY@tok@c\endcsname{\let\PY@it=\textit\def\PY@tc##1{\textcolor[rgb]{0.25,0.50,0.50}{##1}}}

\expandafter\def\csname PY@tok@cp\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.74,0.48,0.00}{##1}}}

\expandafter\def\csname PY@tok@k\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}

\expandafter\def\csname PY@tok@kp\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}

\expandafter\def\csname PY@tok@kt\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.69,0.00,0.25}{##1}}}

\expandafter\def\csname PY@tok@o\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}{##1}}}

\expandafter\def\csname PY@tok@ow\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.67,0.13,1.00}{##1}}}

\expandafter\def\csname PY@tok@nb\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}

\expandafter\def\csname PY@tok@nf\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.00,1.00}{##1}}}

\expandafter\def\csname PY@tok@nc\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.00,1.00}{##1}}}

\expandafter\def\csname PY@tok@nn\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.00,1.00}{##1}}}

\expandafter\def\csname PY@tok@ne\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.82,0.25,0.23}{##1}}}

\expandafter\def\csname PY@tok@nv\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.10,0.09,0.49}{##1}}}

\expandafter\def\csname PY@tok@no\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.53,0.00,0.00}{##1}}}

\expandafter\def\csname PY@tok@n\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.63,0.63,0.00}{##1}}}
\expandafter\def\csname PY@tok@n\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.60,0.60,0.60}{##1}}}
\expandafter\def\csname PY@tok@na\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.49,0.56,0.16}{##1}}}
\expandafter\def\csname PY@tok@nt\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}
\expandafter\def\csname PY@tok@nd\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.67,0.13,1.00}{##1}}}
\expandafter\def\csname PY@tok@s\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}{##1}}}
\expandafter\def\csname PY@tok@sd\endcsname{\let\PY@it=\textit\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}{##1}}}
\expandafter\def\csname PY@tok@si\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.73,0.40,0.53}{##1}}}
\expandafter\def\csname PY@tok@se\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.73,0.40,0.13}{##1}}}
\expandafter\def\csname PY@tok@sr\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.40,0.53}{##1}}}
\expandafter\def\csname PY@tok@ss\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.10,0.09,0.49}{##1}}}
\expandafter\def\csname PY@tok@sx\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}
\expandafter\def\csname PY@tok@m\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}{##1}}}
\expandafter\def\csname PY@tok@gh\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.00,0.50}{##1}}}
\expandafter\def\csname PY@tok@gu\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.50,0.00,0.50}{##1}}}
\expandafter\def\csname PY@tok@gd\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.63,0.00,0.00}{##1}}}
\expandafter\def\csname PY@tok@gi\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.63,0.00}{##1}}}
\expandafter\def\csname PY@tok@gr\endcsname{\def\PY@tc##1{\textcolor[rgb]{1.00,0.00,0.00}{##1}}}
\expandafter\def\csname PY@tok@ge\endcsname{\let\PY@it=\textit}
\expandafter\def\csname PY@tok@gs\endcsname{\let\PY@bf=\textbf}
\expandafter\def\csname PY@tok@gp\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.00,0.50}{##1}}}
\expandafter\def\csname PY@tok@go\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.53,0.53,0.53}{##1}}}
\expandafter\def\csname PY@tok@gt\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.27,0.87}{##1}}}
\expandafter\def\csname PY@tok@err\endcsname{\def\PY@bc##1{\setlength{\fboxsep}{0pt}\fcolorbox[rgb]{1.00,0.00,0.00}{1,1,1}{\strut ##1}}}
\expandafter\def\csname PY@tok@kc\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}
\expandafter\def\csname PY@tok@kd\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}
\expandafter\def\csname PY@tok@kn\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}
\expandafter\def\csname PY@tok@kr\endcsname{\let\PY@bf=\textbf\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}
\expandafter\def\csname PY@tok@bp\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.50,0.00}{##1}}}

```

{##1}}}
\expandafter\def\csname PY@tok@fm\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.00,0.00,1.00}
{##1}}}
\expandafter\def\csname PY@tok@vc\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.10,0.09,0.49}
{##1}}}
\expandafter\def\csname PY@tok@vg\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.10,0.09,0.49}
{##1}}}
\expandafter\def\csname PY@tok@vi\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.10,0.09,0.49}{##1}}}
\expandafter\def\csname PY@tok@vm\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.10,0.09,0.49}
{##1}}}
\expandafter\def\csname PY@tok@sa\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}
{##1}}}
\expandafter\def\csname PY@tok@sb\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}
{##1}}}
\expandafter\def\csname PY@tok@sc\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}
{##1}}}
\expandafter\def\csname PY@tok@dl\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}{##1}}}
\expandafter\def\csname PY@tok@s2\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}
{##1}}}
\expandafter\def\csname PY@tok@sh\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}
{##1}}}
\expandafter\def\csname PY@tok@s1\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.73,0.13,0.13}
{##1}}}
\expandafter\def\csname PY@tok@mb\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}
{##1}}}
\expandafter\def\csname PY@tok@mf\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}
{##1}}}
\expandafter\def\csname PY@tok@mh\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}
{##1}}}
\expandafter\def\csname PY@tok@mi\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}
{##1}}}
\expandafter\def\csname PY@tok@il\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}{##1}}}
\expandafter\def\csname PY@tok@mo\endcsname{\def\PY@tc##1{\textcolor[rgb]{0.40,0.40,0.40}
{##1}}}
\expandafter\def\csname PY@tok@ch\endcsname{\let\PY@it=\textit\def\PY@tc##1{\textcolor[rgb]
{0.25,0.50,0.50}{##1}}}
\expandafter\def\csname PY@tok@cm\endcsname{\let\PY@it=\textit\def\PY@tc##1{\textcolor[rgb]
{0.25,0.50,0.50}{##1}}}
\expandafter\def\csname PY@tok@cpf\endcsname{\let\PY@it=\textit\def\PY@tc##1{\textcolor[rgb]
{0.25,0.50,0.50}{##1}}}
\expandafter\def\csname PY@tok@c1\endcsname{\let\PY@it=\textit\def\PY@tc##1{\textcolor[rgb]
{0.25,0.50,0.50}{##1}}}
\expandafter\def\csname PY@tok@cs\endcsname{\let\PY@it=\textit\def\PY@tc##1{\textcolor[rgb]
{0.25,0.50,0.50}{##1}}}

\def\PYZbs{\char`\}
\def\PYZus{\char`\_}
\def\PYZob{\char`\{

```

```

\def\PYZcb{\char`\}
\def\PYZca{\char`\^}
\def\PYZam{\char`\&}
\def\PYZlt{\char`\<}
\def\PYZgt{\char`\>}
\def\PYZsh{\char`\#}
\def\PYZpc{\char`\%}
\def\PYZdl{\char`\$}
\def\PYZhy{\char`\-}
\def\PYZsq{\char`\'}
\def\PYZdq{\char`\"}
\def\PYZti{\char`\~}
% for compatibility with earlier versions
\def\PYZat{@}
\def\PYZlb{[}
\def\PYZrb{]}
\makeatother

```

% For linebreaks inside Verbatim environment from package fancyvrb.

```

\makeatletter
\newbox\Wrappedcontinuationbox
\newbox\Wrappedvisiblespacebox
\newcommand*\Wrappedvisiblespace {\textcolor{red}\textvisiblespace}
\newcommand*\Wrappedcontinuationsymbol {\textcolor{red}\llap{\tiny$\m@th\hookrightarrow$}}
\newcommand*\Wrappedcontinuationindent {3ex }
\newcommand*\Wrappedafterbreak
{kern\Wrappedcontinuationindent\copy\Wrappedcontinuationbox}
% Take advantage of the already applied Pygments mark-up to insert
% potential linebreaks for TeX processing.
% {, <, #, %, $, ' and ": go to next line.
% __, }, ^, &, >, - and ~: stay at end of broken line.
% Use of \textquotesingle for straight quote.
\newcommand*\Wrappedbreaksatspecials {%
\def\PYGZus{\discretionary{\char`\_}{\Wrappedafterbreak}\char`\_}%
\def\PYGZob{\discretionary{}{\Wrappedafterbreak}\char`\_{\char`\}}%
\def\PYGZcb{\discretionary{\char`\}}{\Wrappedafterbreak}\char`\}}%
\def\PYGZca{\discretionary{\char`\^}{\Wrappedafterbreak}\char`\^}%
\def\PYGZam{\discretionary{\char`\&}{\Wrappedafterbreak}\char`\&}%
\def\PYGZlt{\discretionary{}{\Wrappedafterbreak}\char`\<\char`\<}%
\def\PYGZgt{\discretionary{\char`\>}{\Wrappedafterbreak}\char`\>}%
\def\PYGZsh{\discretionary{}{\Wrappedafterbreak}\char`\#\char`\#}%
\def\PYGZpc{\discretionary{}{\Wrappedafterbreak}\char`\%\char`\}%
\def\PYGZdl{\discretionary{}{\Wrappedafterbreak}\char`\$\char`\$}%
\def\PYGZhy{\discretionary{\char`\-}{\Wrappedafterbreak}\char`\-}%
\def\PYGZsq{\discretionary{}{\Wrappedafterbreak}\textquotesingle\textquotesingle}%
\def\PYGZdq{\discretionary{}{\Wrappedafterbreak}\char`\"\char`\"}%
\def\PYGZti{\discretionary{\char`\~}{\Wrappedafterbreak}\char`\~}%
}

```

```

}
% Some characters . , ; ? ! / are not pygmentized.
% This macro makes them "active" and they will insert potential linebreaks
\newcommand*\Wrappedbreaksatpunct {%
  \lccode`~\lowercase{\def~}{\discretionary{\hbox{\char`~}}{\Wrappedafterbreak}
{\hbox{\char`~}}}%
  \lccode`~\lowercase{\def~}{\discretionary{\hbox{\char`~}}{\Wrappedafterbreak}
{\hbox{\char`~}}}%
  \lccode`~\lowercase{\def~}{\discretionary{\hbox{\char`~}}{\Wrappedafterbreak}
{\hbox{\char`~}}}%
  \lccode`~\lowercase{\def~}{\discretionary{\hbox{\char`~}}{\Wrappedafterbreak}
{\hbox{\char`~}}}%
  \lccode`~\?lowercase{\def~}{\discretionary{\hbox{\char`\?}}{\Wrappedafterbreak}
{\hbox{\char`\?}}}%
  \lccode`~\!lowercase{\def~}{\discretionary{\hbox{\char`\!}}{\Wrappedafterbreak}
{\hbox{\char`\!}}}%
  \lccode`~\Vlowercase{\def~}{\discretionary{\hbox{\char`\V}}{\Wrappedafterbreak}
{\hbox{\char`\V}}}%
  \catcode`\active
  \catcode`\active
  \catcode`\active
  \catcode`\active
  \catcode`\?active
  \catcode`\!active
  \catcode`\Vactive
  \lccode`~\~
}
\makeatother

\let\OriginalVerbatim=\Verbatim
\makeatletter
\renewcommand{\Verbatim}[1][1]{%
  %\parskip\z@skip
  \sbox\Wrappedcontinuationbox {\Wrappedcontinuationsymbol}%
  \sbox\Wrappedvisiblespacebox {\FV@SetupFont\Wrappedvisiblespace}%
  \def\FancyVerbFormatLine ##1{\hsize\linewidth
    \top{\raggedright\hyphenpenalty\z@\exhyphenpenalty\z@
      \doublehyphendemerits\z@\finalhyphendemerits\z@
      \strut ##1\strut}%
  }%
  % If the linebreak is at a space, the latter will be displayed as visible
  % space at end of first line, and a continuation symbol starts next line.
  % Stretch/shrink are however usually zero for typewriter font.
  \def\FV@Space {%
    \nobreak\hskip\z@ plus\fontdimen3\font minus\fontdimen4\font
    \discretionary{\copy\Wrappedvisiblespacebox}{\Wrappedafterbreak}
    {\kern\fontdimen2\font}%
  }%

```



```

% Allow breaks at special characters using \PYG... macros.
\Wrappedbreaksatspecials
% Breaks at punctuation characters . , ; ? ! and / need catcode=\active
\OriginalVerbatim[#1, codes*=\Wrappedbreaksatpunct]%
}
\makeatother

```

```

% Exact colors from NB
\definecolor{incolor}{HTML}{303F9F}
\definecolor{outcolor}{HTML}{D84315}
\definecolor{cellborder}{HTML}{CFCFCF}
\definecolor{cellbackground}{HTML}{F7F7F7}

```

```

% prompt
\makeatletter
\newcommand{\boxspacing}{\kern\kvtcb@left@rule\kern\kvtcb@boxsep}
\makeatother
\newcommand{\prompt}[4]{
  \ttfamily\lap{{\color{#2}[#3]:\hspace{3pt}#4}}\vspace{-\baselineskip}
}

```

```

% Prevent overflowing lines due to hard-to-break entities
\sloppy
% Setup hyperref package
\hypersetup{
  breaklinks=true, % so long urls are correctly broken across lines
  colorlinks=true,
  urlcolor=urlcolor,
  linkcolor=linkcolor,
  citecolor=citecolor,
}
% Slightly bigger margins than the latex defaults

\geometry{verbose,tmargin=1in,bmargin=1in,lmargin=1in,rmargin=1in}

```

```

\begin{document}

```

```

\maketitle

```

```

\hypertarget{indian-food-options-in-major-us-tourist-cities}{%

```

\subsection{Indian Food Options in Major US Tourist Cities}\label{indian-food-options-in-major-us-tourist-cities}}

\hypertarget{introductionbusiness-problem}{%
\subsubsection{Introduction/Business Problem}\label{introductionbusiness-problem}}

Mr.~Kumar from India has to attend a work conference in Boston, United States next month. Family vacation has been overdue for long so he decides on taking his wife and kids along with him. Along with Boston, he has picked Orlando, Florida as one of the destination to spend time with family. His kids are crazy for Disney, so Orlando was an obvious choice. Now with the remaining time, he can only pick one tourist location out of 4 choices: - Chicago - Miami - New York - Los Angeles

Kumar's wife is a big time foodie and specially obsessed with Indian foods. Since all 4 cities have their own set of attractions, So, she decides on picking the 3rd spot based on Indian restaurants.

The problem we aim to solve is to find the best U.S city out of 4 mentioned above for Indian restaurants and the best place out of the selected city to book a hotel.

\hypertarget{data-section}{%
\subsubsection{Data Section}\label{data-section}}

I will use the FourSquare API through venues channel to collect data about locations of Indian Restaurants in 4 major U.S cities mentioned below: - Chicago,IL - Miami, FL - New York, NY - Los Angeles,CA.

\hypertarget{methodology}{%
\subsubsection{Methodology}\label{methodology}}

My goal is to find the best city out of 4 given choices with the highest Indian restaurants density. For this, I have used the Four Square API through the venues channel. I used the near query to get venues in the cities. Also, I have used the CategoryID 4bf58dd8d48988d10f941735 to show only Indian restaurants.

Foursquare limits us to maximum of 100 venues per query. I repeated this request for the 4 U.S cities and got their top 100 venues. I only saved the name and coordinate data from the result and plotted them on the map using Folium for visual inspection.

Next, to get an indicator of the density of Indian restaurants, I calculated a center coordinate of the venues to get the mean longitude and latitude values. Then I calculated the mean of the Euclidean distance from each venue to the mean coordinates. This was my indicator

- mean distance to the mean coordinate.

```
\hypertarget{results}{%  
\subsubsection{Results}\label{results}}
```

From the initial visual inspection through the generated Maps, I see that they all have multiple Indian restaurants specially New York, Los Angeles \& Chicago. Following are the pictures of the geoplot generated with folium:

```
\hypertarget{chicago-il}{%  
\subsubsection{Chicago, IL}\label{chicago-il}}
```

```
\begin{figure}  
\centering  
\includegraphics{attachment:Chicago\%20geoplot1.png}  
\caption{Chicago\%20geoplot1.png}  
\end{figure}
```

```
\hypertarget{miami-fl}{%  
\subsubsection{Miami, FL}\label{miami-fl}}
```

```
\begin{figure}  
\centering  
\includegraphics{attachment:Miami\%20geoplot1.png}  
\caption{Miami\%20geoplot1.png}  
\end{figure}
```

```
\hypertarget{new-york-ny}{%  
\subsubsection{New York, NY}\label{new-york-ny}}
```

```
\begin{figure}  
\centering  
\includegraphics{attachment:NewYork\%20geoplot1.png}  
\caption{NewYork\%20geoplot1.png}  
\end{figure}
```

```
\hypertarget{los-angeles-ca}{%  
\subsubsection{Los Angeles, CA}\label{los-angeles-ca}}
```

```
\begin{figure}  
\centering  
\includegraphics{attachment:LA\%20geoplot1.png}  
\caption{LA\%20geoplot1.png}  
\end{figure}
```

Initial inspection reveals New York, Chicago \& Los Angeles are densely populated cities. But, to get more clarity I calculate the mean

coordinate and the ``Mean distance to Mean coordinate". The mean coordinate is displayed with a red circle and distances with dark green lines.

```
\hypertarget{chicago-il}{%  
\subsubsection{Chicago, IL}\label{chicago-il}}
```

``Mean distance to Mean coordinate" :: 0.054875

```
\begin{figure}  
\centering  
\includegraphics{attachment:Chicago\%20geoplot3.png}  
\caption{Chicago\%20geoplot3.png}  
\end{figure}
```

```
\hypertarget{miami-fl}{%  
\subsubsection{Miami, FL}\label{miami-fl}}
```

``Mean distance to Mean coordinate" :: 0.100926

```
\begin{figure}  
\centering  
\includegraphics{attachment:Miami\%20geoplot3.png}  
\caption{Miami\%20geoplot3.png}  
\end{figure}
```

```
\hypertarget{new-york-ny}{%  
\subsubsection{New York, NY}\label{new-york-ny}}
```

``Mean distance to Mean coordinate" :: 0.025217

```
\begin{figure}  
\centering  
\includegraphics{attachment:NY\%20geoplot3.png}  
\caption{NY\%20geoplot3.png}  
\end{figure}
```

```
\hypertarget{los-angeles-ca}{%  
\subsubsection{Los Angeles, CA}\label{los-angeles-ca}}
```

``Mean distance to Mean coordinate" :: 0.098707

```
\begin{figure}  
\centering  
\includegraphics{attachment:LA\%20geoplot3.png}  
\caption{LA\%20geoplot3.png}  
\end{figure}
```

`\hypertarget{based-on-the-mean-distance-to-mean-coordinate-values-new-york-tops-the-chart-followed-by-chicago.}{%`
`\paragraph{Based on the ``Mean distance to Mean coordinate" values, New`
`York tops the chart followed by`
`Chicago.}\label{based-on-the-mean-distance-to-mean-coordinate-values-new-york-tops-the-chart-followed-by-chicago.}}`

`\hypertarget{discussion}{%`
`\subsubsection{Discussion}\label{discussion}}`

I observed the number of Indian Restaurants is highest in New York followed by Los Angeles. But, based on ``Mean distance to Mean coordinate", Chicago ranks much higher than Los Angeles but still way behind New York.

`\hypertarget{conclusion}{%`
`\subsubsection{Conclusion}\label{conclusion}}`

There is no doubt that New York is the clear winner here with so many Indian restaurants and so close to each other.

Also, it's highly recommended for our tourist to book a hotel close to the mean coordinate to have a delicious vacation. :)

`% Add a bibliography block to the postdoc`

`\end{document}`