Odd Semester (2023)

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Assignment Cover Letter

(Individual Work)

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Course Code	**: COMP6056**	**Course Name**	**: Introduction to Programming**
Class	**: L1AC**	**Name of Lecturer(s)**	**: Ida Bagus Kerthyayana Manuaba**
Major	**: CS**		
Title of Assignment (if any)	: Python Search Engine		
Type of Assignment	**: Final Project**		
Submission Pattern			
Due Date	**: 17-1-2020**	**Submission Date**	**: 12-1-2020**

The assignment should meet the below requirements.

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Signature of Student: (Name of Student)
Andreas Sukardi Teja

"Python Search Engine"

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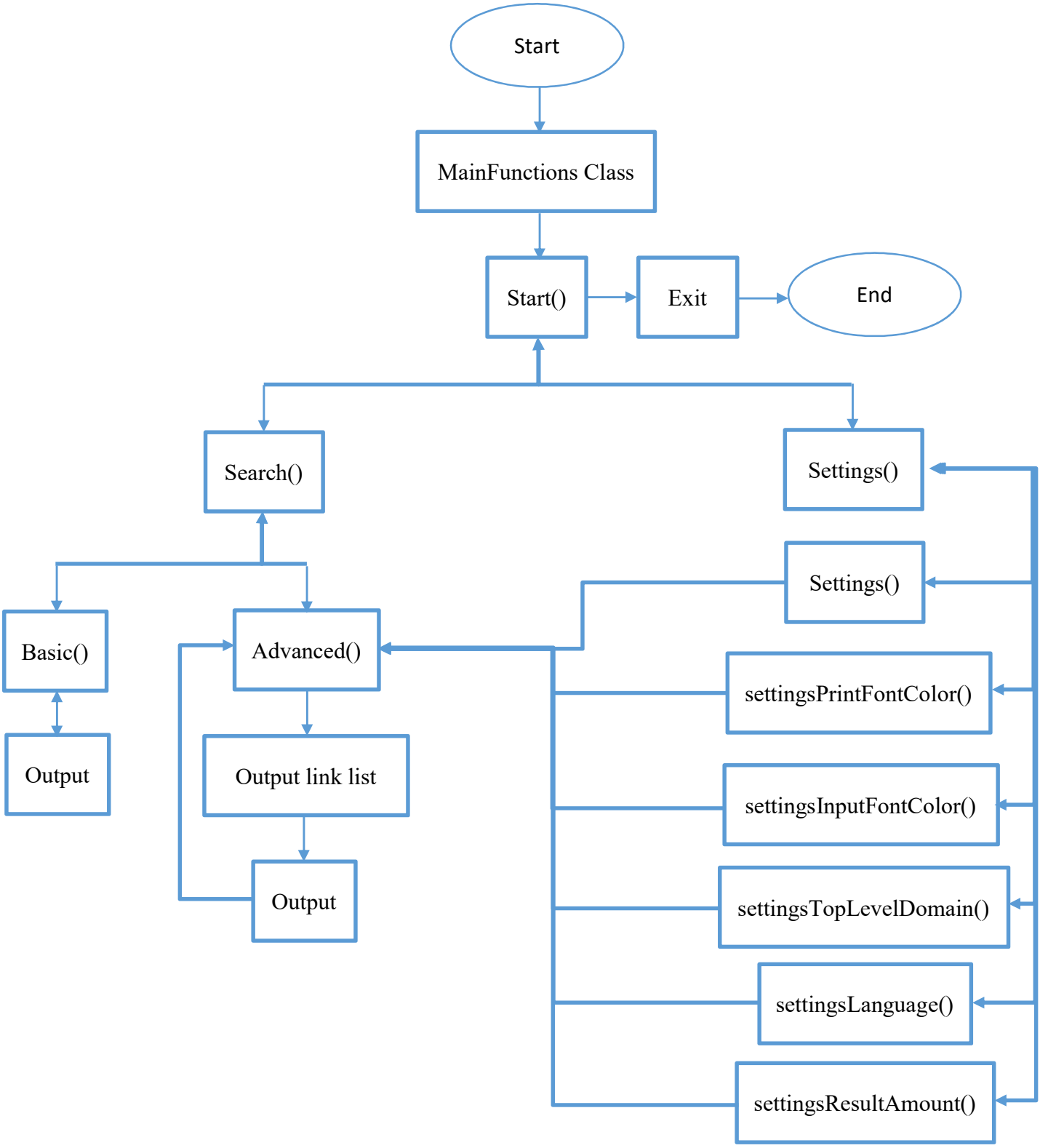
I. Description

The function of this program:

The purpose of this program is take a query from the user in the form of text before using the module **googlesearch** to send a HTTPS request to Google which Google would then return a list of links related to the query and then using the module **webbrowser** to open said link from the default browser of the user's computer. The program also allows the user to change aspects of the HTTPS request such as **language**, **top level domain** and **result amount**. It also has two modes, **basic** and **advanced**. **Basic** simply opens the first link that Google returns while **Advanced** would print a numbered list of links that Google returns, the results shown would be affected by the selected **language** and **top level domain** while how many is shown would be affected by the **result amount** set, the user would then be able to select which link to open by inputting the number assigned to the link. It also has two auxiliary settings that can be changed namely **print font color** and **input font color**, **print font color** only changed the font color of the numbers in the numbered list when using **advanced** mode and the description of a link (if provided by Google) while **input font color** changes the font color of the questions that the program is asking for an input from the user, both functions use the modules **Colorama** and **Termcolor** to allow this. The program also allows the user to exit the program from inside it using the **Sys** module.

II.a. Design/Plan

Project's Hierarchy Chart



II.b.

Explanation of Each Function Inside the Class

Final_Project.py

- **__init__(self, mode=1, printFontColor='white', inputFontColor='cyan', topLevelDomain='com', language='en', resultAmount=10):**
    - Used to set the default settings.
- **Start(self):**
    - Accepts input from the user to detect:
        - Search or s - The program will initialize the search engine.
        - Settings or se - The program will initialize the setting options.
        - help or h - The program will display the possible commands.
        - Exit or e - The program will exit.
        - Abnormal data - The program will print an error message telling the user to use ’help’ to view the available commands.
- **search(self):**
    - Detects which mode it is on.
- **basic(self):**
    - Accepts input from the user as the query.
    - ‘SearchExit’ to go back to **Start(self)**.
    - Automatically opens the first link Google returns.
- **advanced(self):**
    - Accepts input from the user as the query.
    - ‘SearchExit’ to go back to **Start(self)**.
    - Generates a numbered list of links.

- Accepts input from the user as the choice.
- Opens the link the user chose.

- **settings(self):**
  - Accepts input from the user to detect:
    - Mode or m - Starts settingsMode(self):
    - Print font color or p - Starts settingsPrintFontColor(self):
    - Input font color or i - Starts settingsInputFontColor(self):
    - Top Level Domain or t - Starts settingsTopLevelDomain(self):
    - Language or l - Starts settingsLanguage(self):
    - Result Amount or r - Starts settingsResultAmount(self):
    - help or h - The program will the possible commands.
    - back or b - The program will display the previous section.
    - Abnormal data - The program will print an error message telling the user to use ’help’ to view the available commands.
- **settingsMode(self):**
  - Accepts input from the user to detect:
    - basic or b- The program will automatically open the first link that Google provides.
    - advanced or a- The program will display links equal in amount with the value specified in Result Amount before letting the user choose which link to open.
    - help or h - The program will display the possible commands.
    - back or b - The program will display the previous section.

        - Abnormal data - The program will print an error message telling the user to use ’help’ to view the available commands.

- **settingsPrintFontColor(self):**
    - Accepts input from the user to detect:
        - green - The program will ask the user to pick another option due to it already being used for helpFontColor.
        - red - The program will ask the user to pick another option due to it already being used for errorFontColor.
        - yellow, blue, magenta, cyan and white - Changes the color of prints according to the chosen color.
        - help or h - The program will display the possible commands.
        - back or b - The program will display the previous section.
        - Abnormal data - The program will print an error message telling the user to use ’help’ to view the available commands.

- **settingsInputFontColor(self):**
    - Accepts input from the user to detect:
        - green - The program will ask the user to pick another option due to it already being used for helpFontColor.
        - red - The program will ask the user to pick another option due to it already being used for errorFontColor.
        - yellow, blue, magenta, cyan and white - Changes the color of prints according to the chosen color.
        - help or h - The program will display the possible commands.
        - back or b - The program will display the previous section.
        - Abnormal data - The program will print an error message telling the user to use ’help’ to view the available commands.

- **settingsTopLevelDomain(self):**
    - Accepts input from the user to detect:
        - com, net, co.id and com.sg - Changes the TLD into the chosen TLD.
        - org, edu, gov and etc. - The program will ask the user to pick another option due to the TLD being blocked by Indonesia.
        - help or h - The program will display the possible commands.
        - back or b - The program will display the previous section.
        - Abnormal data - The program will print an error message telling the user to use 'help' to view the available commands.
- **settingsLanguage(self):**
    - Accepts input from the user to detect:
        - en - English (US)
        - en-GB - English (UK)
        - zh-CN - Chinese (PRC)
        - zh-TW - Chinese (Taiwan)
        - es - Spanish
        - hi - Hindi
        - ar - Arabic
        - ms - Malay
        - ru - Russian
        - bn - Bengali
        - pt-BR - Portuguese (Brazil)
        - pt-PT - Portuguese (Portugal)
        - fr - French

        - id – Indonesian
        - help or h - The program will display the possible commands.
        - back or b - The program will display the previous section.
        - Abnormal data - The program will print an error message telling the user to use ’help’ to view the available commands.

- **settingsResultAmount(self):**
    - Accepts input from the user to detect:
        - Integers above 0 - Changes the result amount to the input.
        - Integers below or 0 – The program will print an error message telling the user to only integer values above 0.
        - Non-Integers - The program will print an error message telling the user to only input integers.
        - help or h - The program will display the possible commands.
        - back or b - The program will display the previous section.

Class Diagram

MainFunctions
- mode:int - printFontColor:string - inputFontColor:string - topLevelDomain:string - language:string - resultAmount:int
- start() - search() - basic() - advanced() - settings() - settingsMode() - settingsPrintFontColor() - settingsInputFontColor() - settingsTopLevelDomain() - settingsLanguage() - settingsResultAmount()

III.a. Lessons that Have Been Learned

1. *The use of search() in Googlesearch:*

```
from googlesearch import search     # The main module needed to allow the
google search.
```

After a little bit of research, I found a module named **Googlesearch** which gave me access to the search() function.

Basic algorithm:

```
for i in search(query, stop=1):        # Searches the item, it will first
output a generator which 'i' will convert into a link which we can actually
use.
```

Advanced algorithm:

```
for i in search(query, tld=self.topLevelDomain, lang=self.language,
num=100, stop=self.resultAmount):
```

2. *The use of Colorama and Termcolor:*

```
from colorama import init           # Optional module to add color func-
tionality.
from termcolor import colored       # Optional module to assign the colors
to text.
```

After a bit of research on how to add font colors, I found about various methods to do it but decided on using **Colorama** and **Termcolor**.

The colors available from **Colorama**:

taken from pypi.org

The use of colored() from **Termcolor**:

```
settingsOption = input(colored("Which setting would you like to change? ",
self.inputFontColor))
```

III.b. Problem that Have Been Overcome

Like making any type of larger program in a programming language you aren't fully familiar with yet, it's just plain annoying and honestly not that hard when something doesn't work due to the way the programming language handles things and you have to restructure or, in the worst case scenario, remake everything. In my case I initially had two separate Classes, one to handle the main functions such as search(), settings() and exit and another to handle the settings where the default settings are initialized and also where the user can change said settings individually. During testing I found an issue with trying to do things this way and although I believe there is a method to fix it, I decided that its simpler to dump the two-class plan and just merge it into one. Furthermore during testing, I found out that some TLDs are in fact rendered unusable by presumably Indonesia as general and Indonesian TLDs work but not TLDs for other nations. I also found some HTTPS errors caused by abnormal data inputs in settingsResultAmount(), due to some funky mechanics of how try, except and else is handled by Python, I had to go through about 3 iterations of the original algorithm to make it work consistently during stress tests. I attempted using except to block the HTTPS error but apparently that particular error isn't even listed in the except error list, research into the internet also did not turn up any similar issues so I had to solve it myself. Bug-fixing and maybe the help texts were the worst.

IV. Resources :

- geeksforgeeks.org – Learning how to use search()
- pypi.org – To get the list of colors.
- stackoverflow.com – Mostly for bug-fixing but also module finding.

V. Source Code

Final_Project.py

```
# First, pip installing 'google' is necessary for this code to work.
# The module 'google' also has a dependency on 'beautifulsoup' but
# pip install should install 'beautifulsoup' automatically.
# Importing colorama and termcolor is optional, I'm using it only for text font
color.

from googlesearch import search     # The main module needed to allow the google
search.
from colorama import init           # Optional module to add color functionality.
from termcolor import colored       # Optional module to assign the colors to text.

# Using 'from' to reduce risks of name collisions

import sys              # To allow exiting the program from inside the program.
import webbrowser       # The main module needed to allow opening links.

init()      # Initializing colorama.
errorFontColor = 'red'
helpFontColor = 'green'


# Putting these variables outside the classes to ensure they are not edited acci-
dentally.

class MainFunctions:
    def __init__(self, mode=1, printFontColor='white', inputFontColor='cyan', top-
LevelDomain='com', language='en',
                 resultAmount=10):      # Used to assign default settings.
        self.mode = mode
        self.printFontColor = printFontColor
        self.inputFontColor = inputFontColor
        self.topLevelDomain = topLevelDomain
        self.language = language
        self.resultAmount = resultAmount

    def settings(self):     # Used to start up the correct class function according
to the setting the user chose.
        settingsOption = input(colored("Which setting would you like to change? ",
self.inputFontColor))
        if settingsOption == "Mode" or settingsOption == "m":
            self.settingsmode()     # Starts up the class function to change the
mode.
        elif settingsOption == "Print font color" or settingsOption == "p":
            self.settingsPrintFontColor()       # Starts up the class function to
change the print font color.
        elif settingsOption == "Input font color" or settingsOption == "i":
            self.settingsInputFontColor()       # Starts up the class function to
change the input font color.
        elif settingsOption == "Top Level Domain" or settingsOption == "t":
            self.settingsTopLevelDomain()       # Starts up the class function to
change the top level domain.
        elif settingsOption == "Language" or settingsOption == "l":
            self.settingsLanguage()     # Starts up the class to change function the
```

```
language of the results.
        elif settingsOption == "Result Amount" or settingsOption == "r":
            self.settingsResultAmount()     # Starts up the class function to change
the amount of results which will appear.
        elif settingsOption == "help" or settingsOption == "h":     # A help command
for the user to use if they want to see the possible commands for this class.
            print(colored("""
            Mode or m- The option to switch from basic and advanced.
            Print font color or p - The option to change the print font color.
            Input font color or i - The option to change the input font color.
            Top Level Domain or t - The option to change the top level domain.
            Language or l - The option to change the result language.
            Result Amount or r - The option to change how many results you see.
            help or h - The program will display this message.
            back or b - The program will display the previous section.
            """, helpFontColor))
            self.settings()     # Returns the user to the settings class instead of
ending the program.
        elif settingsOption == "back" or settingsOption == "b":
            self.start()        # A command to return the user to the previous class
function.
        else:
            print(colored("Error. Please input 'help' for a list of available com-
mands.", errorFontColor))
            self.settings()     # Tells the user to use 'help' and returns them to
the current class function.

    def settingsmode(self):     # Used to change the mode settings.
        modeInput = input(colored("Which mode would you like? ", self.in-
putFontColor))
        if modeInput == "basic" or modeInput == "b":        # If function to detect
the possible correct inputs and
            self.mode = 1                                   # execute the correct
code in response.
            self.settings()
        elif modeInput == "advanced" or modeInput == "a":
            self.mode = 2
            self.settings()
        elif modeInput == "help" or modeInput == "h":
            print(colored("""
            basic or b- The program will automatically open the first link that
Google provides.
            advanced or a- The program will display links equal in amount with the
value specified in Result Amount
                           before letting the user choose which link to open.
            help or h - The program will display this message.
            back or b - The program will display the previous section.
            """, helpFontColor))
            self.settingsmode()
        elif modeInput == "back" or modeInput == "b":
            self.settings()
        else:
            print(colored("Error. Please input 'help' for a list of available com-
mands.", errorFontColor))
            self.settingsmode()

    def settingsPrintFontColor(self):       # Used to change the print font color.
```

```
        printFontColorInput = input(colored("What color would you like? ", self.in-
putFontColor))
        if printFontColorInput == "yellow" or printFontColorInput == "blue" or
printFontColorInput == "magenta" or printFontColorInput == "cyan" or printFontColor-
Input == "white":     # If function to detect the possible correct inputs and execute
the correct code in response.
            self.printFontColor = printFontColorInput
            self.settings()
        elif printFontColorInput == "green":
            print(colored("Green is used for help texts. Please pick another.", er-
rorFontColor))
            self.settingsPrintFontColor()
        elif printFontColorInput == "red":
            print(colored("Red is used for error texts. Please pick another.", error-
FontColor))
            self.settingsPrintFontColor()
        elif printFontColorInput == "help" or printFontColorInput == "h":
            print(colored("The available colors are:", helpFontColor))
            print(colored("yellow", "yellow"))      #Separate prints to showcase the
different possible colors.
            print(colored("blue", "blue"))
            print(colored("magenta", "magenta"))
            print(colored("cyan", "cyan"))
            print(colored("white", "white"))
            print(colored("""
            Green and Red have been used for help and error texts respectively.
            help or h - The program will display this message.
            back or b - The program will display the previous section.
            """, helpFontColor))
            self.settingsPrintFontColor()
        elif printFontColorInput == "back" or printFontColorInput == "b":
            self.settings()
        else:
            print(colored("Error. Please input 'help' for a list of available com-
mands.", errorFontColor))
            self.settingsPrintFontColor()

    def settingsInputFontColor(self):       # Essentially the same as above.
        inputFontColorInput = input(colored("What color would you like? ", self.in-
putFontColor))
        if inputFontColorInput == "yellow" or inputFontColorInput == "blue" or in-
putFontColorInput == "magenta" or inputFontColorInput == "cyan" or inputFontColorIn-
put == "white":
            self.inputFontColor = inputFontColorInput
            self.settings()
        elif inputFontColorInput == "green":
            print(colored("Green is used for help texts. Please pick another.", er-
rorFontColor))
            self.settingsPrintFontColor()
        elif inputFontColorInput == "red":
            print(colored("Red is used for error texts. Please pick another.", error-
FontColor))
            self.settingsPrintFontColor()
        elif inputFontColorInput == "help" or inputFontColorInput == "h":
            print(colored("The available colors are:", helpFontColor))
            print(colored("yellow", "yellow"))
            print(colored("blue", "blue"))
```

```
            print(colored("magenta", "magenta"))
            print(colored("cyan", "cyan"))
            print(colored("white", "white"))
            print(colored("""
            Green and Red have been used for help and error texts respectively.
            help or h - The program will display this message.
            back or b - The program will display the previous section.
            """, helpFontColor))
            self.settingsInputFontColor()
        elif inputFontColorInput == "back" or inputFontColorInput == "b":
            self.settings()
        else:
            print(colored("Error. Please input 'help' for a list of available com-
mands.", errorFontColor))
            self.settingsInputFontColor()

    def settingsTopLevelDomain(self):       # Used to change the Top Level Domain.
Same concept as above.
        topLevelDomainInput = input(colored("Which Top Level Domain would you like?
", self.inputFontColor))
        if topLevelDomainInput == "com" or topLevelDomainInput == "net" or top-
LevelDomainInput == "co.id" or topLevelDomainInput == "com.sg":
            self.topLevelDomain = topLevelDomainInput
            self.settings()
        elif topLevelDomainInput == "org" or topLevelDomainInput == "edu" or top-
LevelDomainInput == "gov" or topLevelDomainInput == "uk" or topLevelDomainInput ==
"ca" or topLevelDomainInput == "de" or topLevelDomainInput == "jp" or topLevelDomain-
Input == "fr" or topLevelDomainInput == "au" or topLevelDomainInput == "us" or top-
LevelDomainInput == "ru" or topLevelDomainInput == "ch" or topLevelDomainInput ==
"it" or topLevelDomainInput == "nl" or topLevelDomainInput == "se" or topLevelDomain-
Input == "no" or topLevelDomainInput == "es" or topLevelDomainInput == "mil":
            print(colored("Please only use the 'com', 'net', 'co.id' and 'com.sg'
TLDs. Indonesia seems to be blocking other TLDs. Once you connect to the 'co.id' TLD,
Indonesia will force your requests back into 'co.id' no matter what you input and
force the language into Indonesian."))
            self.settingsTopLevelDomain()
        elif topLevelDomainInput == "help" or topLevelDomainInput == "h":       # The
code below are Google's TLD identifiers.
            print(colored("""
            The available TLDs are:
            com - Commercial
            org - Non-commercial
            edu - US accredited post-secondary institutions
            gov - United States Government
            uk - United Kingdom
            net - Network services
            ca - Canada
            de - Germany
            jp - Japan
            fr - France
            au - Australia
            us - United States
            ru - Russian Federation
            ch - Switzerland
            it - Italy
            nl - Netherlands
            se - Sweden
```

```
            no - Norway
            es - Spain
            mil - United States Military
            co.id - Indonesia
            com.sg - Singapore

            Note: This is not a complete list of TLDs, there are 273 TLDs currently
offered by Google so this program
                  will only be accepting the top 20 most popular TLDs, Indonesian and
Singaporean TLDs.

            IMPORTANT NOTE: Indonesia also seem to be intercepting the requests caus-
ing most TLDs to fail except for
                            'com', 'net', 'co.id' and 'com.sg'. It will first display
results in english but after using
                            'co.id' once, Indonesia will force the requests back to
the Indonesian TLD and Indonesian
                            language.

            help or h - The program will display this message.
            back or b - The program will display the previous section.
            """, helpFontColor))
            self.settingsTopLevelDomain()
        elif topLevelDomainInput == "back" or topLevelDomainInput == "b":
            self.settings()
        else:
            print(colored("Error. Please input 'help' for a list of available com-
mands.", errorFontColor))
            self.settingsTopLevelDomain()

    def settingsLanguage(self):     # Used to change the language of the results.
        languageInput = input(colored("Which language would you like? ", self.in-
putFontColor))
        if languageInput == "en" or languageInput == "en-GB" or languageInput == "zh-
CN" or languageInput == "zh-TW" or languageInput == "es" or languageInput == "hi" or
languageInput == "ar" or languageInput == "ms" or languageInput == "ru" or language-
Input == "bn" or languageInput == "pt-BR" or languageInput == "pt-PT" or languageIn-
put == "fr" or languageInput == "id":
            self.language = languageInput
            self.settings()
        elif languageInput == "help" or languageInput == "h":       # Similar to the
above, these are Google's language identifiers.
            print(colored("""
            The available languages are:
            en - English (US)
            en-GB - English (UK)
            zh-CN - Chinese (PRC)
            zh-TW - Chinese (Taiwan)
            es - Spanish
            hi - Hindi
            ar - Arabic
            ms - Malay
            ru - Russian
            bn - Bengali
            pt-BR - Portuguese (Brazil)
            pt-PT - Portuguese (Portugal)
            fr - French
```

```
            id - Indonesian

            Note: This is not a complete list of languages, there are 56 languages
currently offered by Google so this
                  program will only be accepting the top 10 most spoken languages and
Indonesian language.

            help or h - The program will display this message.
            back or b - The program will display the previous section.
            """, helpFontColor))
            self.settingsLanguage()
        elif languageInput == "back" or languageInput == "b":
            self.settings()
        else:
            print(colored("Error. Please input 'help' for a list of available com-
mands.", errorFontColor))
            self.settingsLanguage()

    def settingsResultAmount(self):     # Used to change the amount of results the
user gets.
        resultAmountInput = input(colored("How many results do you want to see? ",
self.inputFontColor))
        if resultAmountInput == "back" or resultAmountInput == "b":
            self.settings()
        try:
            resultAmountInput = int(resultAmountInput)
        except ValueError:      # Detects string inputs which are not 'back' or 'b'
which therefore are abnormal data inputs.
            print(colored("Input is invalid. Please only input integer values.", er-
rorFontColor))
            self.settingsResultAmount()
        except NameError:       # To prevent errors related to the googlesearch mod-
ule.
            print(colored("Input is invalid. Please only input integer values.", er-
rorFontColor))
            self.settingsResultAmount()
        else:
            if resultAmountInput < 1:       # To prevent abnormal integer inputs
which would cause an error during the search.
                print(colored("Input is invalid. Please only input integer values
above 0.", errorFontColor))
                self.settingsResultAmount()
            self.resultAmount = resultAmountInput
            self.settings()

    def start(self):        # The starting 'menu' of sorts for the program.
        startInput = input(colored("What would you like to do? ", self.in-
putFontColor))
        if startInput == "Search" or startInput == "s":
            self.search()
        elif startInput == "Settings" or startInput == "se":
            self.settings()
        elif startInput == "help" or startInput == "h":
            print(colored("""
            Search or s - The program will initialize the search engine.
            Settings or se - The program will initialize the setting options.
            help or h - The program will display this message.
```

```
            Exit or e - The program will exit.
            """, helpFontColor))
            self.start()
        elif startInput == "Exit" or startInput == "e":
            print(colored("Thank you for using my program.", self.printFontColor))
            sys.exit()
        else:
            print(colored("Error. Please input 'help' for a list of available com-
mands.", errorFontColor))
            self.start()

    def search(self):       # Used to trigger either the basic or advanced versions
of the code.
        if self.mode == 1:
            self.basic()
        else:
            self.advanced()

    def basic(self):        # The basic program which automatically opens the first
link Google provides.
        query = input(colored("What would you like to search? ('SearchExit' to exit)
", self.inputFontColor))       # Takes the item which the user wants to search.
        if query == "SearchExit":
            self.start()
        else:
            for i in search(query, stop=1):        # Searches the item, it will first
output a generator which 'i' will convert into a link which we can actually use.
                webbrowser.open(i)      # Function used to open the link.
            self.basic()

    def advanced(self):     # The advanced program which will give the user a list of
links for them to choose from.
        query = input(colored("What would you like to search? ('SearchExit' to exit)
", self.inputFontColor))       # The same as above.
        num = 1     # Just for allowing the use of numbered list.
        lst = []        # Initializing a list to allow link selection.
        if query == "SearchExit":
            self.start()
        else:
            for i in search(query, tld=self.topLevelDomain, lang=self.language,
num=100, stop=self.resultAmount):
                print(colored(str(num) + ". " + i, self.printFontColor))        #
Printing the numbered list.
                lst.append(i)
                num = num + 1
            try:
                choice = eval(input(colored("Which link would you like to open? ",
self.inputFontColor)))
            except TypeError:
                print(colored("Input is invalid. Please only input integer values.",
errorFontColor))
                self.advanced()
            else:
                try:
                    webbrowser.open(lst[choice - 1])
                except KeyError:
```

```
                    print(colored("Input is invalid. Please only input valid inte-
gers.", errorFontColor))
                    self.advanced()
                else:
                    self.advanced()

print("This program allows you to search google from python.\n")
m = MainFunctions()
m.start()       # Initiates the main program.
```