EXAMEN PARCIAL PYTHON

GBI6-2021II: BIOINFORMÁTICA

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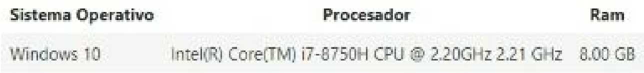


Sistema Operativo	Procesador	Ram
Windows 10	Intel(R) Core(TM) i7-8750H CPU @ 2.20GHz 2.21 GHz	8.00 GB

Color de texto

REQUERIMIENTOS PARA EL EXAMEN

Utilice de preferencia `Jupyter` de Anaconda, dado que tienen que hacer un control de cambios en cada pregunta.

Para este examen se requiere dos documentos:

1. Archivo `miningscience.py` donde tendrá dos funciones:
2. Archivo `2022I_GBI6_ExamenPython` donde se llamará las funciones y se obtendrá resultados.

Ejercicio 0 [0.5 puntos]

Realice cambios al cuaderno de jupyter:

- Agregue el logo de la Universidad
- Coloque sus datos personales
- Escriba una **tabla** con las características de su computador

Ejercicio 1 [2 puntos]

Cree el archivo `miningscience.py` con las siguientes dos funciones:

i. `download_pubmed` : para descargar la data de PubMed utilizando el **ENTREZ** de Biopython. El parámetro de entrada para la función es el `keyword` .

ii. `map_science` : para su data replique el ejemplo de [MapOfScience (https://github.com/CSB-book/CSB/blob/master/regex/solutions/MapOfScience_solution.ipynb)](https://github.com/CSB-book/CSB/blob/master/regex/solutions/MapOfScience_solution.ipynb), donde los puntos resaltados son al menos 5 países

iii *Cree un docstring para cada función.*

Luego de crear las funciones, cargue el módulo `miningscience` como `msc` e **imprima docstring de cada función**.

In [10]:

```
# Escribadef download_pubmed (keyword):
    """
    Muestras de IDs de la busqueda en pubmed
    """
    from Bio import Entrez
    from Bio import SeqIO
    from Bio import GenBank
    Entrez.email = 'juleth.flores@est.ikiam.edu.ec'
    handle = Entrez.research(db='pubmed',
                        sort='relevance',
                        retmax='200',
                        retmode='xml',
                        term=keyword)
    results = Entrez.read(handle)
    id_list = results["IdList"]
    ids = ','.join(id_list)
    Entrez.email = 'juleth.flores@est.ikiam.edu.ec'
    handle = Entrez.efetch(db='pubmed',
                       retmode='xml',
                       id=ids)
    lista_id = ids.split(",")
    return (lista_id)


import csv
import re
import pandas as pd
from collections import Counter

def map_science(tipo):
    """ Docstring map_science """
    """ Esta funcion me permite crear un MapOfScience """
    #if tipo == "AD":
    with open() as f:
        my_text = f.read(tipo)
    my_text = re.sub(r'\n\s{6}', ' ', my_text)
    zipcodes = re.findall(r'[A-Z]{2}\s(\d{5}), USA', my_text)
    unique_zipcodes = list(set(zipcodes))
    unique_zipcodes.sort()
    unique_zipcodes[:10]
    zip_coordinates = {}
    with open('CSB-master/regex/data/MapOfScience/zipcodes_coordinates.txt') as f:
        csvr = csv.DictReader(f)
        for row in csvr:
         zip_coordinates[row['ZIP']] = [float(row['LAT']),
                                        float(row['LNG'])]
    zip_code = []
    zip_long = []
    zip_lat = []
    zip_count = []
    for z in unique_zipcodes:
    # if we can find the coordinates
        if z in zip_coordinates.keys():
            zip_code.append(z)
            zip_lat.append(zip_coordinates[z][0])
            zip_long.append(zip_coordinates[z][1])
            zip_count.append(zipcodes.count(z))
    import matplotlib.pyplot as plt
    #%matplotlib inline
    plt.scatter(zip_long, zip_lat, s = zip_count, c= zip_count)
    plt.colorbar()
# only continental us without Alaska
    plt.xlim(-125,-65)
    plt.ylim(23, 50)
# add a few cities for reference (optional)
    ard = dict(arrowstyle="->")
    plt.annotate('Austin', xy = (-122.1381, 37.4292),
                   xytext = (-112.1381, 37.4292), arrowprops= ard)
    plt.annotate('San Francisco', xy = (-71.1106, 42.3736),
                   xytext = (-73.1106, 48.3736), arrowprops= ard)
    plt.annotate('New York', xy = (-87.6847, 41.8369),
                   xytext = (-87.6847, 46.8369), arrowprops= ard)
    plt.annotate('Chicago', xy = (-122.33, 47.61),
                   xytext = (-116.33, 47.61), arrowprops= ard)
    plt.annotate('San Diego', xy = (-80.21, 25.7753),
                   xytext = (-80.21, 30.7753), arrowprops= ard)
    params = plt.gcf()
    plSize = params.get_size_inches()
    params.set_size_inches( (plSize[0] * 3, plSize[1] * 3) )
    return plt.show()
```

```
  File "C:\Users\aula\AppData\Local\Temp/ipykernel_13572/1403090939.py", lin
e 2
    """
    ^
IndentationError: unexpected indent
```

Ejercicio 2 [2 puntos]

Utilice dos veces la función `download_pubmed` para:

- Descargar la data, utilizando los keyword de su preferencia.
- Guardar el archivo descargado en la carpeta `data` .

Para cada corrida, imprima lo siguiente:

```
'El número artículos para KEYWORD es: XX' # Que se cargue con inserción de texto o
valor que correspondea KEYWORD y XX
```

In [2]:

```
?miningscience.map_science
```

In [ ]:

```
?miningscience.download_pubmed
```

In [ ]:

```
from Bio import Entrez
from Bio import SeqIO
from Bio import GenBank
from collections import Counter
import csv
import re
import pandas as pd

```

In [ ]:

```
miningscience.download_pubmed("Lion")
```

In [ ]:

```
# Contribución de los autores
with open("data/pubmed_results.txt") as datafile:
    author_dict = {}
    for line in datafile:
        if re.match("AD", line):
            author = line.split("-", 1)[-1]# capture author
            author = author.strip()# remove leading and trailing whitespace
            author_dict[author] = 1 + author_dict.get(author, 0)# if key is present, add 1,
```

In [ ]:

```
for author in sorted(author_dict, key = author_dict.get, reverse = True):
    print(author, ":", author_dict[author])
```

```
Health PEI (German, Lutes), Charlottetown, PEI; McGill University Health Centre : 35 Centre for Ophthalmology
and Visual Science (incorporating Lions Eye Institute), : 33 Centre for Ophthalmology and Visual Science, The
University of Western Australia, : 32 Centre for Eye Research Australia, Royal Victorian Eye and Ear Hospital,
East : 30 Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, : 18 International Centre
for Eye Health, London School of Hygiene and Tropical : 18 Senior Department of Infectious Diseases, The
Fifth Medical Center of Chinese PLA : 18 Centre for Ophthalmology and Visual Science (Incorporating Lions
Eye Institute), : 17 Partnership for Advanced Computing in Europe 1050 Bruxelles, Belgium. : 17 Garvan-
Weizmann Centre for Cellular Genomics, Garvan Institute of Medical : 15 Australian Inherited Retinal Disease
Registry and DNA Bank, Department of Medical : 15 Department of Ophthalmology, Boston Children's Hospital,
Harvard Medical School, : 15 Tianjin Key Laboratory of Retinal Functions and Diseases, Tianjin Branch of : 15
The LION Foundation for Dental Health (Public Interest Incorporated Foundation), : 15 Institute of Epidemiology,
Disease Control and Research (IEDCR), Dhaka, : 15 The International Society of Applied Neuroimaging (ISAN),
Denver, CO, United : 14 Centre for Ophthalmology and Visual Science, University of Western Australia, : 14
Laboratory of Deep Sea Microbial Cell Biology, Institute of Deep-Sea Science and : 14 Department of
Ophthalmology, Saarland University Medical Center (UKS), Kirrberger : 14 Treatment and Research Center for
Infectious Diseases, The Fifth Medical Center : 14 Department of Ophthalmology, B.P Koirala Lions Center for
Ophthalmic Studies, : 13 Department of Ophthalmology and Visual Neurosciences, University of Minnesota, :
13 Key Laboratory of Tropical Translational Medicine of Ministry of Education, : 13 The University of Leicester
Ulverscroft Eye Unit, Department of Neuroscience, : 13 Department of Anatomy, College of Osteopathic
Medicine, Des Moines University, : 13 Centre for Eye Research Australia, Royal Victorian Eye and Ear Hospital,
: 12 Department of Pathogen Biology, Hainan Medical University, Haikou, China. : 12 Laboratory of Infectious
Diseases, College of Veterinary Medicine, Konkuk : 12 ICAR-Indian Veterinary Research Institute, Izatnagar,
Bareilly-243122, Uttar : 12 Ocular Tissue Engineering Laboratory, Lions Eye Institute, Nedlands, WA 6009, : 12
```

```
Institute of Hematology and Blood Transfusion, Prague, Czech Republic. : 11 Lions Eye Institute, Nedlands, Western Australia, Australia. : 11 Department of Clinical Microbiology, Infection and Immunology, Umea University, : 11 Department of Ophthalmology, Flinders University, Flinders Medical Centre, : 11 Department of Ophthalmology, Bascom Palmer Eye Institute, University of Miami : 11 Department of Ophthalmology, Juntendo University Graduate School of Medicine, : 11 Department of Digital Medicine, Juntendo University Graduate School of Medicine, : 11 Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, : 11 Antwerp Unit for Data Analysis and Computation in Immunology and Sequencing, : 11 Department of Immunology, Genetics and Pathology, Uppsala University, 75185 : 11 Nanchang Key Laboratory of Animal Health and Safety Production, Jiangxi : 11 Arthur and Sonia Labatt Brain Tumor Research Centre, Hospital for Sick Children, : 11 College of Wildlife and Protected Area, Northeast Forestry University, Harbin, : 10 Faculty of Science, Sydney School of Veterinary Science, The University of : 10 Human Immunology and Immunopathology, Institut National de la Sante et de la : 10 European Synchrotron Radiation Facility, 71 Avenue des Martyrs, 38000 Grenoble, : 10 Laboratory of Experimental Hematology, Vaccine and Infectious Disease Institute : 10 Hoopes Vision Research Center, Hoopes Vision, Draper, UT, USA. : 10 Washington National Primate Research Center, University of Washington, Seattle, : 10 IHAP, UMR1225, Universite de Toulouse, INRAE, Ecole Veterinaire de Toulouse, : 10 Bureau de Recherches Geologiques et Minieres (BRGM - French Geological Survey), 3 : 10 Interdisciplinary Cluster for Applied Genoproteomics, University of Liege, CHU, : 10 Department of Internal Medicine I, Division of Hematology & Hemostaseology, : 10 Human Immunology, Pathophysiology, Immunotherapy (HIPI), INSERM U976, Universite : 10 John A. Moran Eye Center, University of Utah School of Medicine, Salt Lake City, : 9 Centre for Ophthalmology and Visual Sciences (incorporating the Lions Eye : 9 Human Immunology, Pathophysiology and Immunotherapy, INSERM U 976, University : 9 Nektar Therapeutics, San Francisco, California, USA. : 9 International Society of Applied Neuroimaging, Denver, CO, United States. : 9 Zambian Carnivore Programme, PO Box 80, Mfuwe, Eastern Province, Zambia. : 9 Sahlgrenska Center for Cancer Research, Department of Laboratory Medicine, : 9 Department of Medical Biosciences, Pathology, Umea University, Building 6M, : 9 Laboratory of Experimental Hematology, Vaccine & Infectious Disease Institute : 9 Massachusetts Eye and Ear, Department of Ophthalmology, Harvard Medical School, : 9 Colorado Division of Parks and Wildlife, 4330 Laporte Avenue, Fort Collins, : 9 Google Health, Google LLC, Mountain View, California. : 9 Department of Microbiology, University of Washington, Seattle, WA, United States. : 9 Research and Development Head Quarters, LION Corporation, Odawara, Kanagawa, : 9 Univ. Lille, CNRS, UMR 8576-UGSF-Unite de Glycobiologie Structurale et : 9 Centre for Eye Research Australia, Royal Victorian Eye and Ear Hospital, 32 : 9 Department of Anatomy and Physiology, The University of Melbourne, Parkville, : 8 School of Medicine, Menzies Research Institute Tasmania, University of Tasmania, : 8 NIHR ARC NWC, Liverpool, UK. : 8
```

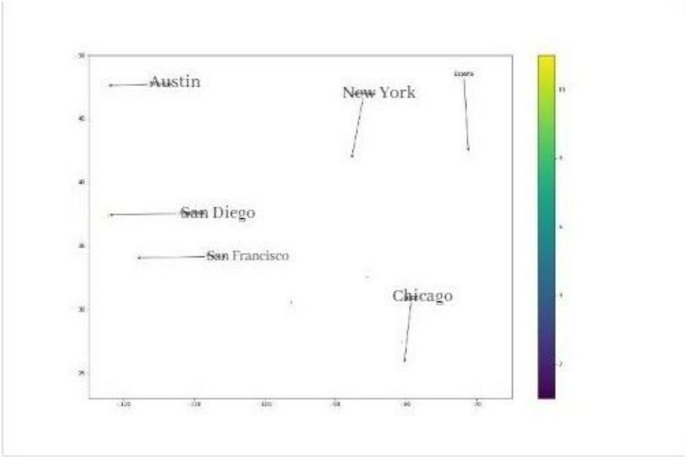
Ejercicio 3 [1.5 puntos]

Utilice dos veces la función `map_science` para:

- Visualizar un mapa para cada data descargada en el ejercicio 2.
- Guardar los mapas en la carpeta `img`

In [4]:

```
miningscience.map_science("data/pubmed_results.txt")
```



Ejercicio 4 [1 punto]

Interprete los resultados de las figuras del **ejercicio 3**

Escriba la respuesta del ejercicio 5

Interpretacón del ejercicio 3

Juleth Flores ha realizado la interpretación del ejercicio 4 donde La Ciudad de San Diego es la que posee el mayor número de publicaciones expuestas con las ciudades de San Francisco y Austin mientras que, Chicago y New York tienen menos publicaciones.

Ejercicio 5 [2 puntos]

Para algún **gen de interés** (podría usar Lista de genes por tipología (https://www.genome.jp/kegg/pathway.html#metabolism)), realice lo siguiente:

1. Una búsqueda en la página del NCBI nucleotide (https://www.ncbi.nlm.nih.gov/nucleotide/).
2. Descargue el `Accession List` de su búsqueda y guarde en la carpeta `data` .
3. Cargue el `Accession List` en este notebook y haga una descarga de las secuencias de los **quince primeros** IDs de la accesión.
4. Arme un árbol filogenético para los resultados del paso 3.
5. Guarde su arbol filogénetico en la carpeta `img`
6. Interprete el árbol del paso 4.

In [3]:

```
from Bio import SeqIO
from Bio import AlignIO
from Bio import Phylo
```

In [ ]:

```
from Bio.Align.Applications import ClustalwCommandline
import os
```

In [ ]:

```
# cargar data multiple y crear alineamientos
clustalw_exe = r"C:\Program Files (x86)\ClustalW2\clustalw2.exe"
clustalw_cline = ClustalwCommandline(clustalw_exe, infile = "data/rag2s.fasta")
assert os.path.isfile(clustalw_exe), "Clustal_W executable is missing or not found"
stdout, stderr = clustalw_cline()
print(clustalw_cline)
```

In [ ]:

```
ClustalAlign = AlignIO.read("data/rag2s.aln", "clustal")
print(ClustalAlign)
```

```
**Escriba aquí la interpretación del árbol**


Alignment with 133 rows and 2895 columns
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--------------------------------------------...--- FJ230858.1
--------------------------------------------...--- FJ039926.1
--------------------------------------------...--- FJ039990.1
--------------------------------------------...--- FJ039983.1
--------------------------------------------...--- FJ039976.1
--------------------------------------------...--- FJ039969.1
--------------------------------------------...--- FJ039962.1
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--------------------------------------------...--- FJ039947.1
--------------------------------------------...--- FJ039940.1
--------------------------------------------...--- FJ039933.1
--------------------------------------------...--- FJ009033.1
--------------------------------------------...--- FJ039997.1
--------------------------------------------...--- FJ009026.1
--------------------------------------------...--- FJ039919.1
--------------------------------------------...--- FJ039912.1
--------------------------------------------...--- FJ230872.1
...
--------------------------------------------...--- FJ230875.1
```

In [ ]:

```python
# Generar Dendogram (Tree)
from Bio import Phylo
tree = Phylo.read("data/rag2s.dnd", "newick")
Phylo.draw_ascii(tree)
```

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## Ejercicio 6 [1 punto]

1. Cree en GitHub un repositorio de nombre ```GBI6_ExamenPython```.
2. Cree un archivo ```Readme.md``` que debe tener lo siguiente:
- Datos personales
- Características del computador
- Versión de Python/Anaconda y de cada uno de los módulos/paquetes y utilizados
- Explicación de la data utilizada
- Un diagrama de procesos del módulo ```miningscience```
3. Asegurarse que su repositorio tiene las carpetas ```data``` e ```img``` con los
archivos que ha ido guardando en las preguntas anteriores.
4. Realice al menos 1 control de la versión (commits) por cada ejercicio (del 1 al 5),
con un mensaje que inicie como:

```sh
Carlitos Alimaña ha realizado el ejercicio 1
```
```sh
Carlitos Alimaña ha realizado el ejercicio 2
```
```sh
...
```
~~~~

In [ ]: