Data Science amb Python

Sprint 17

S17 T02: Base de dades MySQL

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Description

Create database with MySQL.

Nivel 1

- Exercises 1

Create a simple relational database using MySQL (https://www.mysql.com/) and connect it to Python

In [1]:
```
!pip install mysql-connector-python
```

```
Requirement already satisfied: mysql-connector-python in /Applications/anac
onda3/lib/python3.8/site-packages (8.0.25)
Requirement already satisfied: protobuf>=3.0.0 in /Applications/anaconda3/l
ib/python3.8/site-packages (from mysql-connector-python) (3.17.3)
Requirement already satisfied: six>=1.9 in /Applications/anaconda3/lib/pyth
on3.8/site-packages (from protobuf>=3.0.0->mysql-connector-python) (1.15.0)
```

In [2]:
```
import mysql.connector


mydb = mysql.connector.connect(host="localhost",
                               user="root",
                               password="password",
                              database="employees_database")

print(mydb)
```

```
<mysql.connector.connection.MySQLConnection object at 0x7f8d458a1340>
```

The database "employees_database" was created in mysql workbench and it was connected to the pyhton.

Now I'll create a table 'employees' and input some values on it.

In [3]:
```
mycursor = mydb.cursor()

mycursor.execute("CREATE TABLE employees(emp_id CHAR(9),f_name VARCHAR(15)
```

In [5]:
```
sql = "INSERT INTO employees (emp_id, f_name, l_name, b_date, salary, dep_
val = [('EMP645789', 'Maria', 'Silva', '1975-08-04', 1860.90, 'FIN000567'),
       ('EMP235789', 'Ana', 'Castillo', '1984-07-09',  1960.70, 'TEC000
       ('EMP235112', 'Jose', 'Borit','1982-12-14', 1760.70, 'TEC000987'
       ('EMP895134', 'Idalina', 'Tamas','1989-11-25', 1760.70, 'ADM0005
       ('EMP895135', 'Jaume', 'Martínez','1987-06-25',  1560.70, 'ADM00
       ('EMP895185', 'Cynthia', 'Measor','1990-01-09', 1560.70, 'TEC000
       ('EMP895131', 'Alonso', 'Mugg','1965-07-09', 1960.70, 'TEC000987
       ('EMP895101', 'Judy', 'Ribey','1983-02-09',  1760.70, 'TEC000987
      ]

mycursor.executemany(sql, val)

mydb.commit()
```

Nivel 2

- Exercises 2

Show that you can upload some simple queries to a Pandas Dataframe.

In [6]:
```
# import the library pandas
import pandas as pd
```

In [7]:
```
# create a dataframe with the function read_sql from pandas
'''
Create a daframe with all values.
'''

df = pd.read_sql("""
SELECT *
FROM employees""",
con = mydb)

df
```

Out[7]:

	emp_id	f_name	l_name	b_date	salary	dep_id
0	EMP645789	Maria	Silva	1975-08-04	1860.9	FIN000567
1	EMP235789	Ana	Castillo	1984-07-09	1960.7	TEC000987
2	EMP235112	Jose	Borit	1982-12-14	1760.7	TEC000987
3	EMP895134	Idalina	Tamas	1989-11-25	1760.7	ADM000524
4	EMP895135	Jaume	Martínez	1987-06-25	1560.7	ADM000524
5	EMP895185	Cynthia	Measor	1990-01-09	1560.7	TEC000987
6	EMP895131	Alonso	Mugg	1965-07-09	1960.7	TEC000987
7	EMP895101	Judy	Ribey	1983-02-09	1760.7	TEC000987

In [8]:

```
'''
Create a daframe with salaries bigger than 1600
in  ascending order by employees' name.
'''

df_salary = pd.read_sql("""
SELECT f_name, salary
FROM employees
WHERE salary > 1600
ORDER BY f_name""", con = mydb)

df_salary
```

Out[8]:

	f_name	salary
0	Alonso	1960.7
1	Ana	1960.7
2	Idalina	1760.7
3	Jose	1760.7
4	Judy	1760.7
5	Maria	1860.9

In [9]:

```
'''
Create a daframe with people borned
before 1980.
'''

df_date = pd.read_sql("""
SELECT f_name, b_date
FROM employees
WHERE b_date < '1980-01-01'""",
                      con = mydb)

df_date
```

Out[9]:

	f_name	b_date
0	Maria	1975-08-04
1	Alonso	1965-07-09

Nivel 3

- Exercise 3

Generate a graph that summarizes the data.

In [10]:

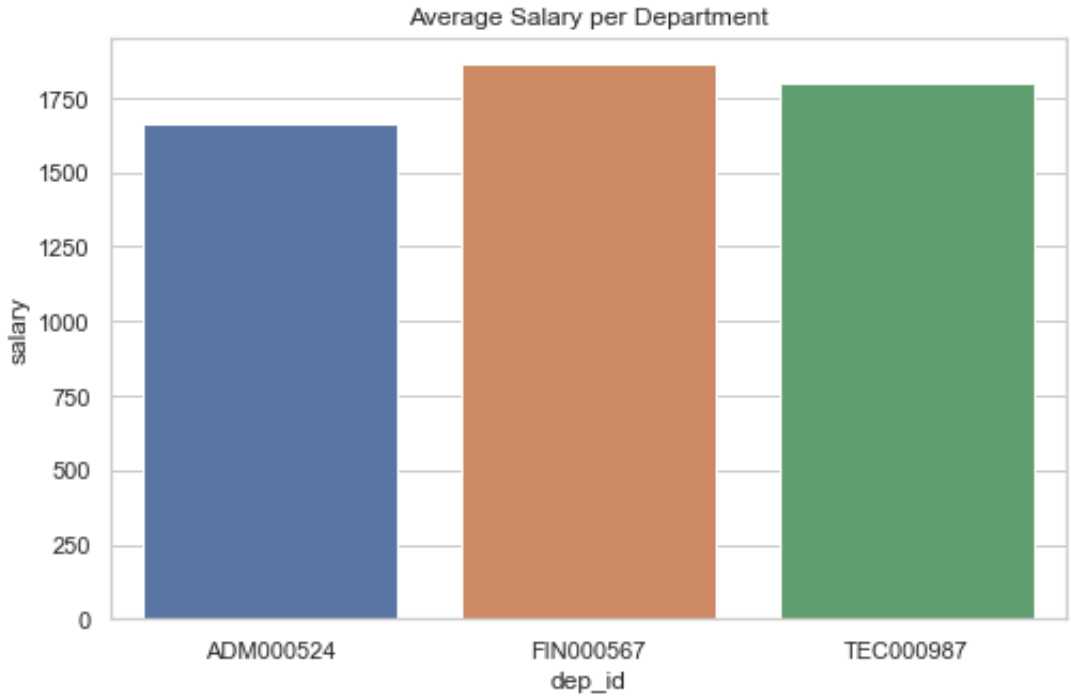
```
# import library seaborn
import matplotlib.pyplot as plt
import seaborn as sns

# evaluate the average salary by departament

salary_avg = pd.DataFrame(df.groupby('dep_id')['salary'].mean()).reset_inde
salary_avg
```

Out[10]:

	dep_id	salary
0	ADM000524	1660.7
1	FIN000567	1860.9
2	TEC000987	1800.7

In [26]:

```
plt.figure(figsize=(8,5))

sns.set_theme(style="whitegrid")
sns.barplot(x = 'dep_id', y = 'salary', data =salary_avg )
plt.title('Average Salary per Department');
```



We can see that the FIN000567 department (finances) is the one which has the biggest average salary, followed by the TEC000987 (technology) and ADM000524 (administration).

Let's see how is the correlation between salary and age.

In [12]:
```
#copy the df dataframe
df_new = df.copy()

# see its information

df_new.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8 entries, 0 to 7
Data columns (total 6 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   emp_id  8 non-null      object 
 1   f_name  8 non-null      object 
 2   l_name  8 non-null      object 
 3   b_date  8 non-null      object 
 4   salary  8 non-null      float64
 5   dep_id  8 non-null      object 
dtypes: float64(1), object(5)
memory usage: 512.0+ bytes
```

In [13]:
```
#convert date to datetime

df_new['b_date'] = pd.to_datetime(df['b_date'])
df_new.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8 entries, 0 to 7
Data columns (total 6 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   emp_id  8 non-null      object
 1   f_name  8 non-null      object
 2   l_name  8 non-null      object
 3   b_date  8 non-null      datetime64[ns]
 4   salary  8 non-null      float64
 5   dep_id  8 non-null      object
dtypes: datetime64[ns](1), float64(1), object(4)
memory usage: 512.0+ bytes
```

In [14]:
```
df_new
```

Out[14]:

	emp_id	f_name	l_name	b_date	salary	dep_id
0	EMP645789	Maria	Silva	1975-08-04	1860.9	FIN000567
1	EMP235789	Ana	Castillo	1984-07-09	1960.7	TEC000987
2	EMP235112	Jose	Borit	1982-12-14	1760.7	TEC000987
3	EMP895134	Idalina	Tamas	1989-11-25	1760.7	ADM000524
4	EMP895135	Jaume	Martínez	1987-06-25	1560.7	ADM000524
5	EMP895185	Cynthia	Measor	1990-01-09	1560.7	TEC000987
6	EMP895131	Alonso	Mugg	1965-07-09	1960.7	TEC000987
7	EMP895101	Judy	Ribey	1983-02-09	1760.7	TEC000987

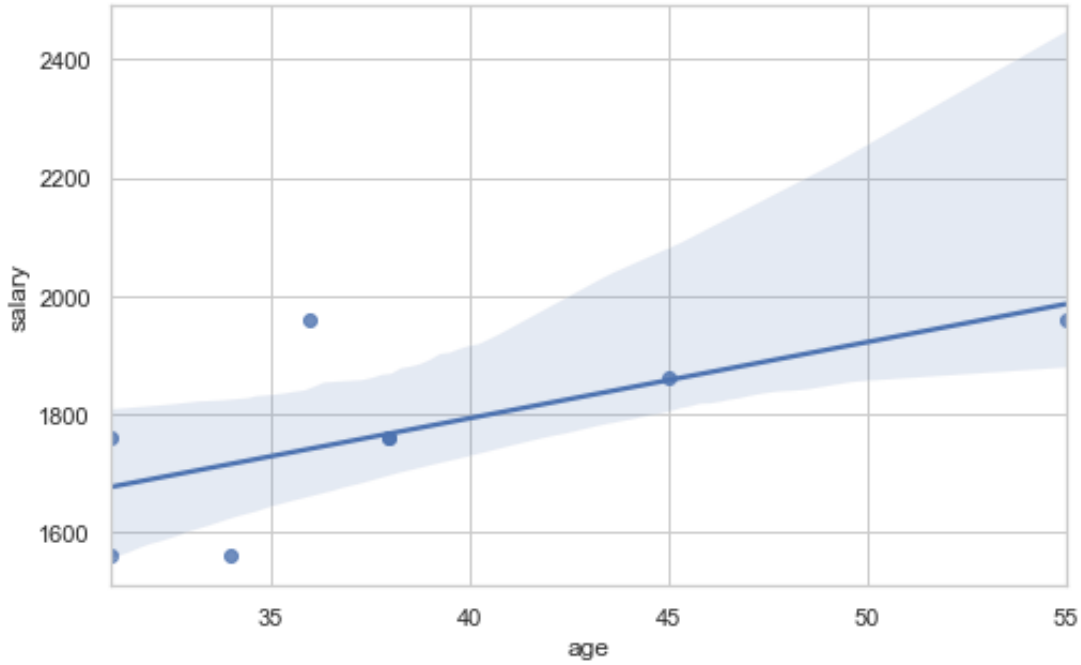
In [16]:
```
#Create a age column
import datetime

def from_dob_to_age(born):
    today = datetime.date.today()
    return today.year - born.year - ((today.month, today.day) < (born.month

df_new['age'] = df_new['b_date'].apply(lambda x: from_dob_to_age(x))
```

In [17]:
```
df_new
```

Out[17]:

	emp_id	f_name	l_name	b_date	salary	dep_id	age
0	EMP645789	Maria	Silva	1975-08-04	1860.9	FIN000567	45
1	EMP235789	Ana	Castillo	1984-07-09	1960.7	TEC000987	36
2	EMP235112	Jose	Borit	1982-12-14	1760.7	TEC000987	38
3	EMP895134	Idalina	Tamas	1989-11-25	1760.7	ADM000524	31
4	EMP895135	Jaume	Martínez	1987-06-25	1560.7	ADM000524	34
5	EMP895185	Cynthia	Measor	1990-01-09	1560.7	TEC000987	31
6	EMP895131	Alonso	Mugg	1965-07-09	1960.7	TEC000987	55
7	EMP895101	Judy	Ribey	1983-02-09	1760.7	TEC000987	38

In [25]:
```
plt.figure(figsize=(8,5))
sns.regplot(x="age", y="salary", data=df_new);
```



In [19]:
```
df_new.corr()
```

Out[19]:

	salary	age
salary	1.000000	0.668432
age	0.668432	1.000000

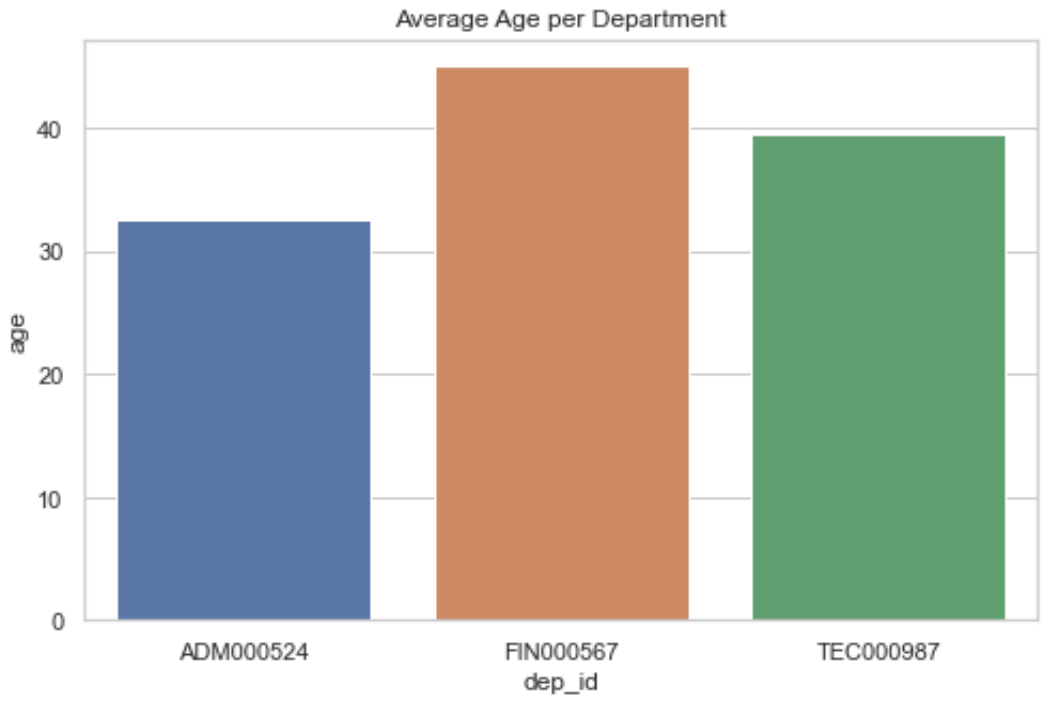
The graph shows that there is a positive correlation between age and salary, that is, salary grows with age. However the correlation is not very high as shown by the correlation coefficient, 0.67. This means that, in this case, the biggest salary does not always belong to the eldest.

In [21]:
```
# evaluate the average age by departament

age_avg = pd.DataFrame(df_new.groupby('dep_id')['age'].mean()).reset_index
age_avg
```

Out[21]:

	dep_id	age
0	ADM000524	32.5
1	FIN000567	45.0
2	TEC000987	39.6

In [27]:
```
plt.figure(figsize=(8,5))

sns.set_theme(style="whitegrid")
sns.barplot(x = 'dep_id', y = 'age', data =age_avg )
plt.title('Average Age per Department');
```



The graph above shows that the Finance department has the biggest average age among the three departemnts , 45.

however, more people would be needed in this department as there is only one.

In [ ]:
```

```