Census case study

INTRODUCTION TO DATABASES IN PYTHON

Jason Myers

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Census case study

- Preparing SQLAlchemy and the database
- Loading data into the database
- Solving data science problems with queries

Part 1: preparing SQLAlchemy and the database

- Create an engine and `MetaData` object

```
from sqlalchemy import create_engine, MetaData
engine = create_engine('sqlite:///census_nyc.sqlite')
metadata = MetaData()
```

Part 1: preparing SQLAlchemy and the database

- Create and save the census table

```
from sqlalchemy import (Table, Column, String,
        Integer, Decimal, Boolean)
employees = Table('employees', metadata,
        Column('id', Integer()),
        Column('name', String(255)),
        Column('salary', Decimal()),
        Column('active', Boolean()))
metadata.create_all(engine)
```

Let's practice!

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Populating the database

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Part 2: populating the database

- Load a CSV file into a values list

```
values_list = []
for row in csv_reader:
    data = {'state': row[0], 'sex': row[1], 'age': row[2],
            'pop2000': row[3], 'pop2008': row[4]}
    values_list.append(data)
```

Part 2: Populating the Database

- Insert the values list into the census table

```
from sqlalchemy import insert
stmt = insert(employees)
result_proxy = connection.execute(stmt, values_list)
print(result_proxy.rowcount)
```

```
2
```

Let's practice!

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Querying the database

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Part 3: answering data science questions with queries

- Determine average age for males and females

```
from sqlalchemy import select
stmt = select([census.columns.sex,
          (func.sum(census.columns.pop2008 *
           census.columns.age) /
           func.sum(census.columns.pop2008)
         ).label('average_age')])
stmt = stmt.group_by('census.columns.sex')
results = connection.execute(stmt).fetchall()
```

Part 3: answering data science questions with queries

- Determine the percentage of Females for each state

```
from sqlalchemy import case, cast, Float
stmt = select([
          (func.sum(
              case([
                  (census.columns.state == 'New York',
                   census.columns.pop2008)
              ], else_=0)) /
           cast(func.sum(census.columns.pop2008),
                Float) * 100).label('ny_percent')])
```

Part 3: answering data science questions with queries

- Determine the top 5 states by population change from 2000 to 2008

```
stmt = select([census.columns.age,
          (census.columns.pop2008-
          census.columns.pop2000).label('pop_change')
      ])
stmt = stmt.order_by('pop_change')
stmt = stmt.limit(5)
```

Let's practice!

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Congratulations!

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