Data Mining 101

Now we have the data in a datastore, how are we going to get useful information out?

SQL Query => Simple Aggregation (mean) => Simple Statistics (standard deviation) => Hypothesis Testing => Data Mining => Artificial Intelligence

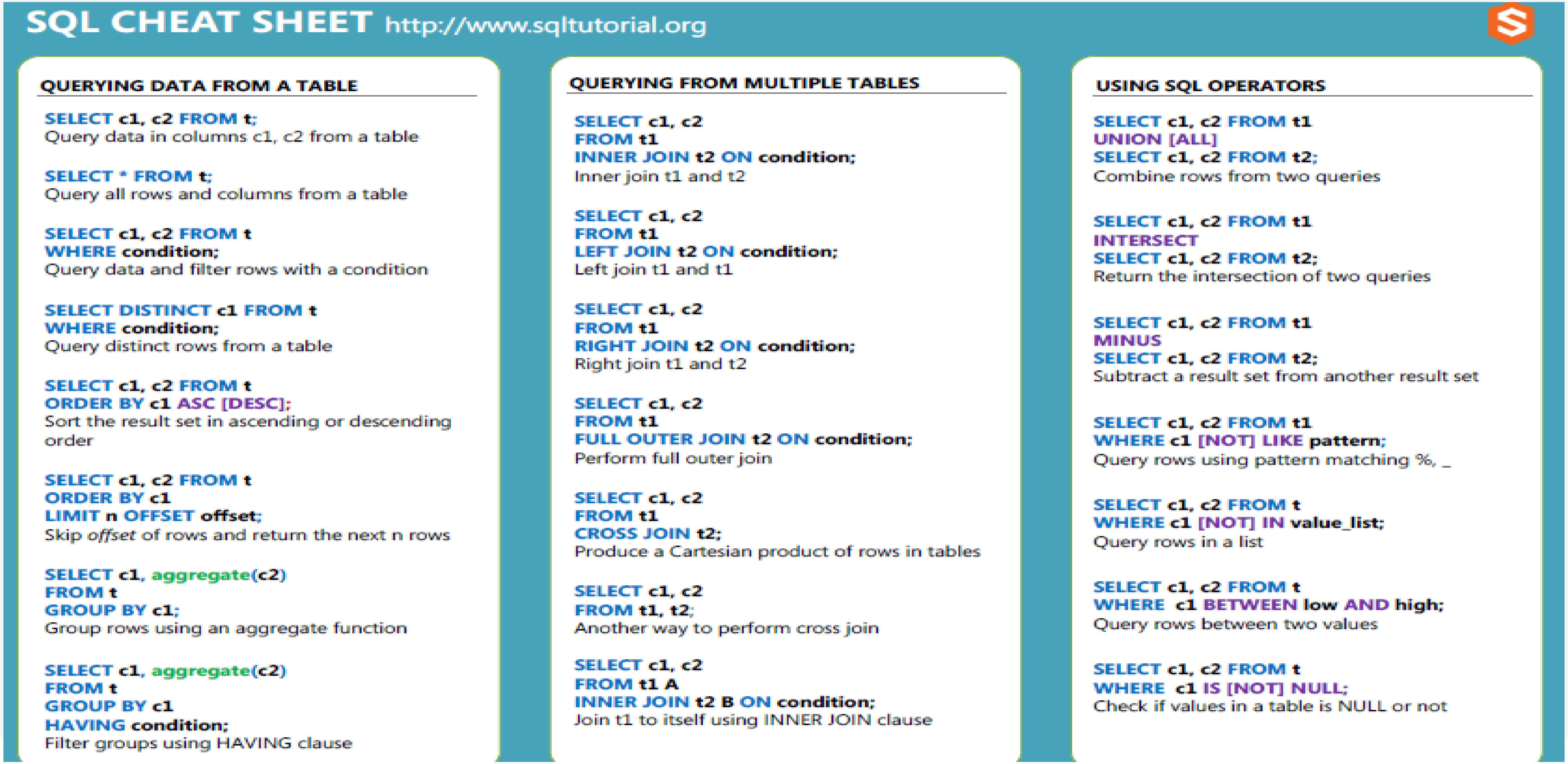
- Make sure you master SQL well
- Low hanging fruits;
- Best bang for the bucks!

SQL

Learning by doing

https://www.w3resource.com/sql-exercises/

SQL CheatSheet



SQL CHEAT SHEET http://www.sqltutorial.org

QUERYING DATA FROM A TABLE

```
SELECT c1, c2 FROM t;
```
Query data in columns c1, c2 from a table

```
SELECT * FROM t;
```
Query all rows and columns from a table

```
SELECT c1, c2 FROM t
WHERE condition;
```
Query data and filter rows with a condition

```
SELECT DISTINCT c1 FROM t
WHERE condition;
```
Query distinct rows from a table

```
SELECT c1, c2 FROM t
ORDER BY c1 ASC [DESC];
```
Sort the result set in ascending or descending order

```
SELECT c1, c2 FROM t
ORDER BY c1
LIMIT n OFFSET offset;
```
Skip *offset* of rows and return the next n rows

```
SELECT c1, aggregate(c2)
FROM t
GROUP BY c1;
```
Group rows using an aggregate function

```
SELECT c1, aggregate(c2)
FROM t
GROUP BY c1
HAVING condition;
```
Filter groups using HAVING clause

QUERYING FROM MULTIPLE TABLES

```
SELECT c1, c2
FROM t1
INNER JOIN t2 ON condition;
```
Inner join t1 and t2

```
SELECT c1, c2
FROM t1
LEFT JOIN t2 ON condition;
```
Left join t1 and t1

```
SELECT c1, c2
FROM t1
RIGHT JOIN t2 ON condition;
```
Right join t1 and t2

```
SELECT c1, c2
FROM t1
FULL OUTER JOIN t2 ON condition;
```
Perform full outer join

```
SELECT c1, c2
FROM t1
CROSS JOIN t2;
```
Produce a Cartesian product of rows in tables

```
SELECT c1, c2
FROM t1, t2;
```
Another way to perform cross join

```
SELECT c1, c2
FROM t1 A
INNER JOIN t2 B ON condition;
```
Join t1 to itself using INNER JOIN clause

USING SQL OPERATORS

```
SELECT c1, c2 FROM t1
UNION [ALL]
SELECT c1, c2 FROM t2;
```
Combine rows from two queries

```
SELECT c1, c2 FROM t1
INTERSECT
SELECT c1, c2 FROM t2;
```
Return the intersection of two queries

```
SELECT c1, c2 FROM t1
MINUS
SELECT c1, c2 FROM t2;
```
Subtract a result set from another result set

```
SELECT c1, c2 FROM t1
WHERE c1 [NOT] LIKE pattern;
```
Query rows using pattern matching %, _

```
SELECT c1, c2 FROM t
WHERE c1 [NOT] IN value_list;
```
Query rows in a list

```
SELECT c1, c2 FROM t
WHERE  c1 BETWEEN low AND high;
```
Query rows between two values

```
SELECT c1, c2 FROM t
WHERE  c1 IS [NOT] NULL;
```
Check if values in a table is NULL or not

SQL Check-list

- What are primary keys
- How to select subset data
- How to join two tables
- How to group by data

Note: We will NOT spend too much time on SQL, because many of the functions can be done in Python and you should learn it in a formal database class. However, you should make sure you know SQL well !
And I will have at least one (basic) question on SQL in Mid-term

Some useful resources

MS SQL Server 2017 Free Edition

- https://www.microsoft.com/en-us/sql-server/sql-server-editions-express

MS SQL Sample Database

- https://docs.microsoft.com/en-us/sql/samples/adventureworks-install-configure?view=sql-server-2017

MS Azure Data Studio Download

- https://docs.microsoft.com/en-us/sql/azure-data-studio/download?view=sql-server-2017

Extra Credits (class participation)

Email me (chiuyan.pang@qc.cuny.edu) a screen shot of your laptop that you had installed one of the database server:

1. MS SQL Server for Windows

https://www.microsoft.com/en-us/sql-server/sql-server-editions-express

1. Postgres for Mac

https://www.postgresql.org/download/macosx/

3. MySQL for Mac:

https://dev.mysql.com/downloads/mysql/