## PROJECT 3 – DATA SCIENCE JOBS MARKET ANALYSIS

### **Scope and Criteria**

The purpose of this project is to design and implement an ETL pipeline that processes our data and stores it within a SQL database for future recalling and exploration.

## **Key Metrics:**

Available positions, salaries, location, company rating

#### **Resources:**

Kaggle data set with 485 rows of data in 8 columns

#### **Collaborators:**

Chuck Bui

**Amanuel Lebassi** 

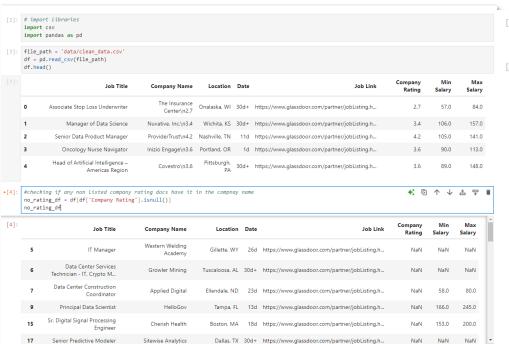
Beau Massie

**Christopher Turner** 

# **QUICK TAKE**

- The "Cleaned Data Science Job Market & Salaries 2024" was chosen because it had many relevant key attributes that we were interested in, such as salary data, job titles, company names and ratings.
- We cleaned our database by handling null values, dropping unneeded information, reformatting values such as 'Date' to 'Days Listed, created new columns like Job Category from inside the 'Job Title' column as well as a 'Postings' to count the number of postings per state.
- We chose PostGreSQL for its ease of use for housing our database as well future exploration using SQL queries.
- We used the psycopg2 driver to automatically create our tables from within Python.
- A total number of 7 tables were created into PostGreSQL: a main database with all our cleaned and formatted data, then 6 other bite sized tables focused on each different job category as well as remote or non-remote.

## LOAD THE DATA AND BEGIN CLEANING



```
[5]: #removing the ratings from the company names

df['Company Name'] = df['Company Name'].str.split('\n').str[0]

df
```

:	Job Title	Company Name	Location	Date	Job Link	Company Rating	Min Salary	Max Salary
0	Associate Stop Loss Underwriter	The Insurance Center	Onalaska, WI	30d+	https://www.glassdoor.com/partner/jobListing.h	2.7	57.0	84.0
1	Manager of Data Science	Nuvative, Inc.	Wichita, KS	30d+	https://www.glassdoor.com/partner/jobListing.h	3.4	106.0	157.0
2	Senior Data Product Manager	ProviderTrust	Nashville, TN	11d	https://www.glassdoor.com/partner/jobListing.h	4.2	105.0	141.0
3	Oncology Nurse Navigator	Inizio Engage	Portland, OR	1d	https://www.glassdoor.com/partner/jobListing.h	3.6	90.0	113.0
4	Head of Artificial Intelligence – Americas Region	Covestro	Pittsburgh, PA	30d+	https://www.glassdoor.com/partner/jobListing.h	3.6	89.0	148.0
480	Cloud Administrator	GM Financial	Arlington, TX	25d	https://www.glassdoor.com/partner/jobListing.h	4.0	NaN	NaN
481	Robotics Engineer (AI)	Alpha Net Consulting	United States	4d	https://www.glassdoor.com/partner/jobListing.h	NaN	NaN	NaN
482	Tchr of English- Newark School of Data Science	Newark Board of Education	Newark, NJ	30d+	https://www.glassdoor.com/partner/jobListing.h	3.3	62.0	107.0
483	Statistician	Sciome LLC	Research Triangle Park, NC	30d+	https://www.glassdoor.com/partner/jobListing.h	NaN	NaN	NaN
484	Quantitative Analytics Manager - Data Modeling	Freddie Mac	McLean, VA	5d	https://www.glassdoor.com/partner/jobListing.h	3.6	140.0	210.0

485 rows × 8 columns

[6]: # Dropping the Job Link column and creating a new DataFrame
df = df.drop('Job Link', axis=1)

# Display the cleaned DataFrame
df.head()

[6]:	Job Title	Company Name	Location	Date	Company Rating	Min Salary	Max Salary
	Associate Stop Loss Underwriter	The Insurance Center	Onalaska, WI	30d+	2.7	57.0	84.0
	1 Manager of Data Science	Nuvative, Inc.	Wichita, KS	30d+	3.4	106.0	157.0
	2 Senior Data Product Manager	ProviderTrust	Nashville, TN	11d	4.2	105.0	141.0
	Oncology Nurse Navigator	Inizio Engage	Portland, OR	1d	3.6	90.0	113.0
	4 Head of Artificial Intelligence – Americas Region	Covestro	Pittsburgh, PA	30d+	3.6	89.0	148.0

```
[7]: # Remove 'd' and 'd+' from the days_listed column

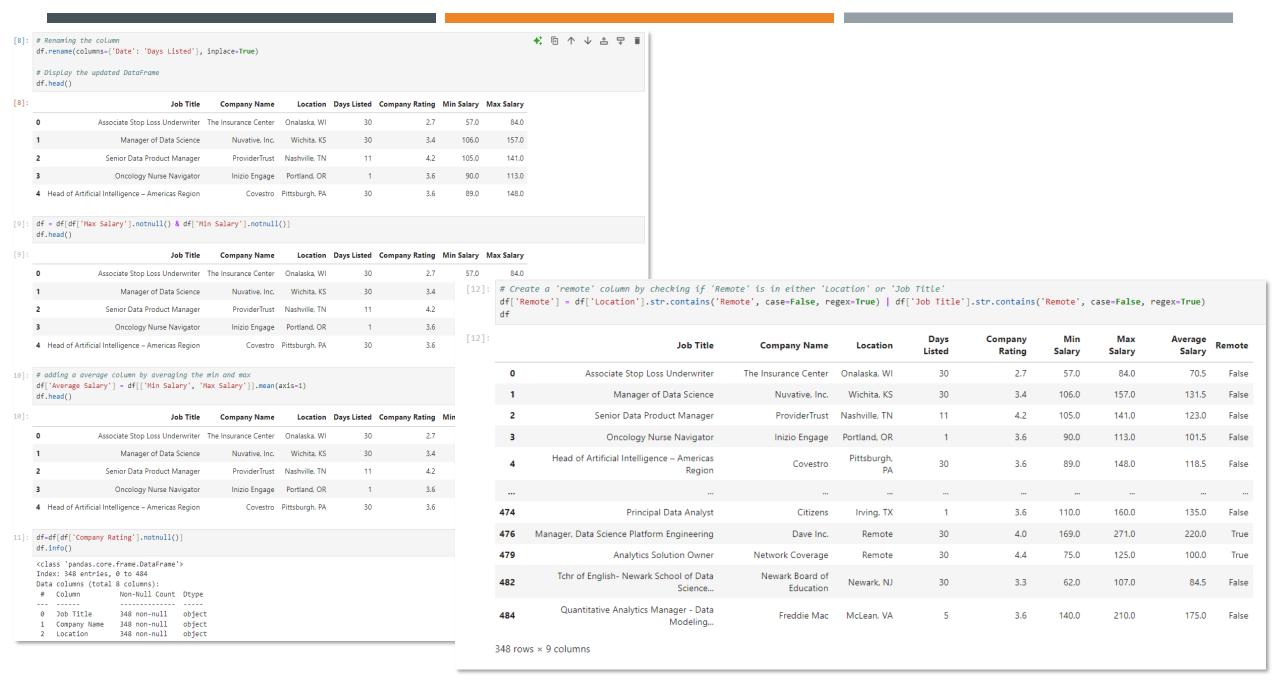
df['Date'] = df['Date'].str.replace('d\+', '', regex=True)

df['Date'] = df['Date'].str.replace('24h', '1', regex=False)

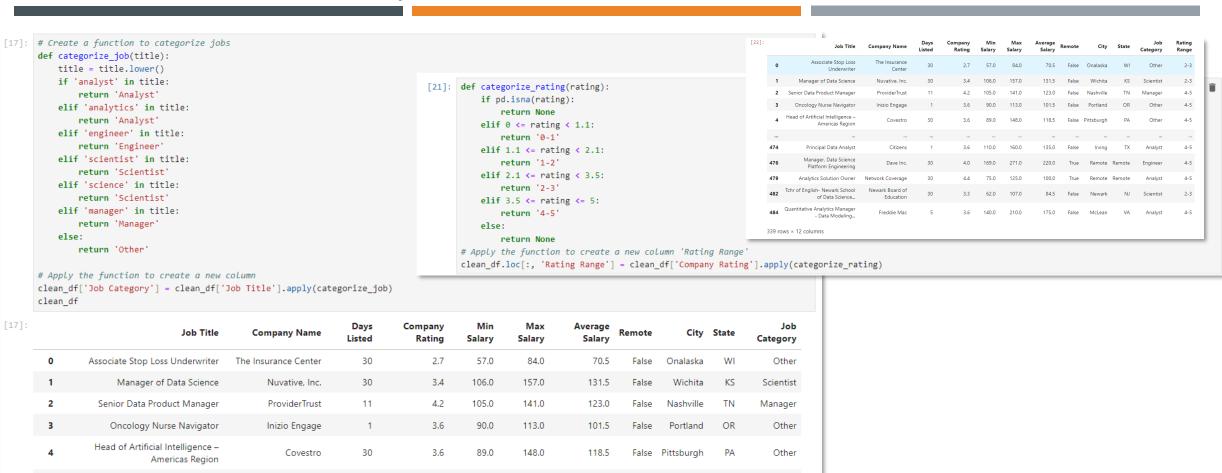
# Display the updated DataFrame

df.head()
```

## CLEANING AND CREATING COLUMNS

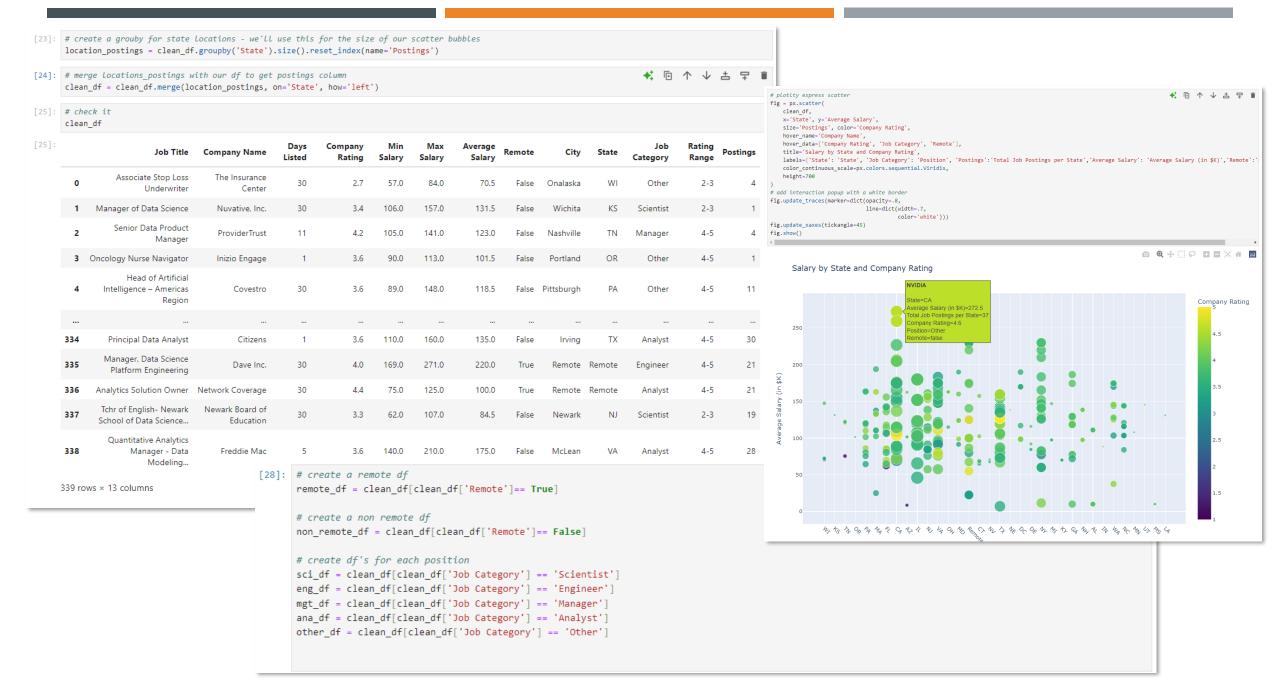


# CREATING 'JOB CATEGORY' AND 'COMPANY RATING'



0 1 2	Associate Stop Loss Underwriter  Manager of Data Science	The Insurance Center  Nuvative, Inc.	30 30	2.7	57.0	84.0	70.5	False	Onalaska	WI	Othe
2	-	Nuvative, Inc.	30	2.4							
			50	3.4	106.0	157.0	131.5	False	Wichita	KS	Scientis
	Senior Data Product Manager	ProviderTrust	11	4.2	105.0	141.0	123.0	False	Nashville	TN	Manage
3	Oncology Nurse Navigator	Inizio Engage	1	3.6	90.0	113.0	101.5	False	Portland	OR	Othe
4	Head of Artificial Intelligence – Americas Region	Covestro	30	3.6	89.0	148.0	118.5	False	Pittsburgh	PA	Othe
174	Principal Data Analyst	Citizens	1	3.6	110.0	160.0	135.0	False	Irving	TX	Analys
176	Manager, Data Science Platform Engineering	Dave Inc.	30	4.0	169.0	271.0	220.0	True	Remote	None	Engine
179	Analytics Solution Owner	Network Coverage	30	4.4	75.0	125.0	100.0	True	Remote	None	Analys
182	Tchr of English- Newark School of Data Science	Newark Board of Education	30	3.3	62.0	107.0	84.5	False	Newark	NJ	Scientis
184 <sup>Q</sup>	Quantitative Analytics Manager - Data Modeling	Freddie Mac	5	3.6	140.0	210.0	175.0	False	McLean	VA	Analys

### CREATING 'POSTINGS' COLUMN AND OUR DATAFRAMES



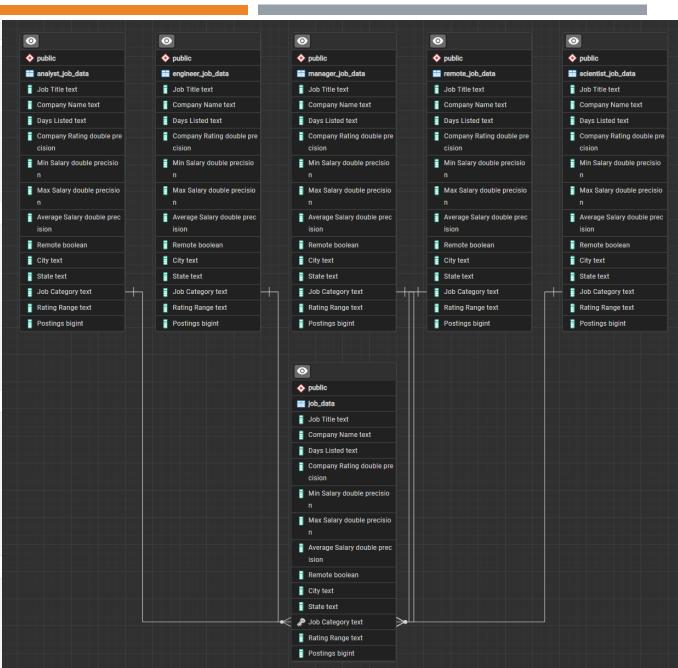
## CHECKING ON OUR DATA

```
Counts for each Rating Range
0-1
         3
2-3
        45
4-5
       291
Name: Company Rating, dtype: int64
5 Highest paying companies for Company Name
NVIDIA
            265,277778
Indeed
            262,000000
Insurity
            240.750000
            230.000000
Rokt
Lime
            229.500000
Name: Average Salary, dtype: float64
Top 5 rated companies
                          Company Rating Average Salary Postings
Company Name
Blackstone Group
                                     5.0
                                                   145.0
                                                              24.0
Openwork, LLC
                                     5.0
                                                   127.0
                                                              30.0
Penfield Search Partners
                                     5.0
                                                   104.5
                                                              37.0
Vital Edge Solutions
                                     5.0
                                                   125.0
                                                              21.0
Emergent Software
                                     4.8
                                                    55.0
                                                              21.0
5 Highest paying states sorted by State
     169.135135
    151.000000
    150.444444
    146.857143
     145.500000
Name: Average Salary, dtype: float64
Top 5 rated State
      4.300000
     4.300000
     4.200000
     4.133333
      4.000000
Name: Company Rating, dtype: float64
```

```
#category rating and salary includes remote and onsite
average rating salary by category = clean df.groupby('Job Category')[['Company Rating', 'Average Salary']].mean()
print(average rating salary by category)
              Company Rating Average Salary
Job Category
Analyst
                    3.761176
                                  115.700000
Engineer
                    3.833962
                                 151.594340
                    3.900000
                                  129.850000
Manager
0ther
                    3.763077
                                 109.284615
Scientist
                    3.858730
                                 131.563492
average salary remote = clean df['Remote'] == True]['Average Salary'].mean()
average_rating_remote = clean_df[clean_df['Remote'] == True]['Company Rating'].mean()
average salary non remote = clean df[clean df['Remote'] == False]['Average Salary'].mean()
average_rating_non_remote = clean_df[clean_df['Remote'] == False]['Company Rating'].mean()
print(f"Average Salary for Remote Jobs: {average salary remote}")
print(f"Average Rating for Remote Jobs: {average rating remote}")
print(f"Average Salary for Non-Remote Jobs: {average_salary_non_remote}")
print(f"Average Rating for Non-Remote Jobs: {average rating non remote}")
Average Salary for Remote Jobs: 119.6891891891892
Average Rating for Remote Jobs: 3.775675675675676
Average Salary for Non-Remote Jobs: 127.21688741721854
Average Rating for Non-Remote Jobs: 3.8178807947019866
best companies = clean df[['Company Name', 'Average Salary', 'Company Rating', 'Postings']].sort values(
    by=['Company Rating', 'Postings'],ascending=False)
best companies.head()
```

# CREATING TABLES IN POSTGRESQL

```
# run this in bash to install psycopg2: pip install sqlalchemy psycopg2
# job_data: this is the full data table - use psycopg2 to create tables in PostgreSQL
from sqlalchemy import create_engine
# Create an engine to connect to PostgreSQL
engine = create_engine('postgresql://postgres:postgres@localhost:5432/job_data')
data = clean_df
# Writing the data to a new table in the PostgreSQL database
data.to sql('job data', engine, if exists='replace', index=False)
print("Data written to PostgreSQL successfully!")
Data written to PostgreSQL successfully!
# non_remote_job_data- use psycopg2 to create tables in PostgreSQL
from sqlalchemy import create_engine
# Create an engine to connect to PostgreSQL
engine = create_engine('postgresql://postgres:postgres@localhost:5432/job_data')
data = non remote df
# Writing the data to a new table in the PostgreSQL database
data.to_sql('non_remote_job_data', engine, if_exists='replace', index=False)
print("Data written to PostgreSQL successfully!")
Data written to PostgreSQL successfully!
# remote_job_data - use psycopg2 to create tables in PostgreSQL
from sqlalchemy import create_engine
# Create an engine to connect to PostgreSQL
engine = create_engine('postgresql://postgres:postgres@localhost:5432/job_data')
data = remote_df
# Writing the data to a new table in the PostgreSQL database
data.to_sql('remote_job_data', engine, if_exists='replace', index=False)
print("Data written to PostgreSQL successfully!")
Data written to PostgreSQL successfully!
# scientist_job_data - use psycopg2 to create tables in PostgreSQL
from sqlalchemy import create_engine
# Create an engine to connect to PostgreSQL
engine = create_engine('postgresql://postgres:postgres@localhost:5432/job_data')
data = sci_df
```



# CHECKING TABLES IN POSTGRESQL

Query Query History												
1 v SELECT * FROM job_data												
2 3 SELECT * FROM analyst_job_data												
4 5 SELECT * FROM engineer_job_data												
6												
7 SELECT * FROM manager_job_data 8												
9 SELECT * FROM scientist_job_data												
0 1 SELECT * FROM non_remote_job_data												
13 SELECT * FROM remote_job_data												
Data Output Messages Notifications												
➡     ■     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □     □ </td <td></td>												
Job Title text	Company Name text	Days Listed text	Company Rating double precision	Min Salary double precision	Max Salary double precision	Average Salary double precision	Remote boolean	City text	State text	Job Category text	Rating Range text	Postings bigint
1 Associate Stop Loss Underwriter	The Insurance Center	30	2.7				false	Onalaska	WI	Other	2-3	4
2 Manager of Data Science	Nuvative, Inc.	30	3.4	106	157	131.5	false	Wichita	KS	Scientist	2-3	1
3 Senior Data Product Manager	ProviderTrust	11	4.2	105	141	123	false	Nashville	TN	Manager	4-5	4
4 Oncology Nurse Navigator	Inizio Engage		3.6	90	113	101.5	false	Portland	OR	Other	4-5	1
5 Head of Artificial Intelligence – Americas Region	Covestro	30	3.6	5 89	148	118.5	false	Pittsburgh	PA	Other	4-5	11
6 Senior AlOps Engineer	Health Data Analytics Institute	30	4.4	151	175	163	false	Dedham	MA	Engineer	4-5	10
7 Training Department Supervisor	Esquire Law Services	27	1	60	65	62.5	false	Palm Beach Gardens	FL	Other	0-1	15
8 Senior Data Scientist	Idea Financial	30	4.1	112	! 169	140.5	false	Miami	FL	Scientist	4-5	15
9 Machine Learning Engineer	Digital Force Technologies	30	3.3	140	170	155	false	San Diego	CA	Engineer	2-3	37
10 IT Site Engineer (labs)	Oxford Global Resources		3.4	50	) (	25	false	Lexington	MA	Engineer	2-3	10
11 RN Clinical Educator	Inizio Engage		3.6	90	113	101.5	false	Phoenix	AZ	Other	4-5	3
12 Junior Game Mathematician	Incredible Technologies	30	3.5	5 37	55	46	false	Vernon Hills	IL	Other	4-5	40
13 Senior Manager Advanced Analytics (US)	TD Bank	30	3.9	111	166	138.5	false	Mount Laurel	NJ	Analyst	4-5	19
14 AI/ML Subject Matter Expert	Thomas & Herbert Consulting LLC	30	2.4	165	175	170	false	Springfield	VA	Other	2-3	28
15 Lead Al Developer	SeeScan Inc.	30	3.6	125	175	150	false	San Diego	CA	Other	4-5	37
16 Data Scientist	Commonwealth Health Insurance Connector Auth	30	3.8	100	105	102.5	false	Boston	MA	Scientist	4-5	10
Data Scientist - Manufacturing Analytics	Pilot Chemical Co.	30	3.7	7 95	135	115	false	West Chester	ОН	Analyst	4-5	4
18 Project Manager/ Senior Data Analyst	HumanTouch LLC		3.4	75	108	91.5	false	Patuxent River	MD	Analyst	2-3	7
19 Data Science Technical Fellow	Indeed	30	4.1	214	310	262	true	Remote	Remote	Scientist	4-5	21
20 Artificial Intelligence (AI) Cybersecurity Architect	The Travelers Companies, Inc.		4.1	119	196	157.5	false	Hartford	СТ	Other	4-5	5
21 Director - Systems and Technology - Data, Artificial Intelligence and Portfolio Delivery	SoCalGas	30	4.4	165	248	206.5	false	Los Angeles	CA	Other	4-5	37
22 Al Integration Specialist	De Castroverde Law Group	30	3.9	54	87	70.5	false	Las Vegas	NV	Other	4-5	2
23 Data Analyst (Onsite)	The Greentree Group	30	4.5	5 55	i 84	69.5	false	Tallahassee	FL	Analyst	4-5	15
24 Digital Marketing Specialist (Paid Media Focus)	Gentle Monster	30	2.9	65	75	70	false	Anaheim	CA	Other	2-3	37
25 Senior Data Scientist	Navy Federal Credit Union		4.1	98	174	136	false	Pensacola	FL	Scientist	4-5	15
26 Statistician	Gladney Center for Adoption		4	52	! 82	. 67	false	Fort Worth	TX	Other	4-5	30
27 Senior Research Scientist - Adversarial Machine Learning	Carnegie Mellon University	30	4.4	61	111	86	false	Pittsburgh	PA	Scientist	4-5	11
28 Principal Data Scientist - Time Series	Navy Federal Credit Union	30	4.1	112	200	156	false	Pensacola	FL	Scientist	4-5	15
29 NC3 Systems Engineer - Omaha	Johns Hopkins Applied Physics Laboratory (APL)	30	4.3	117	160	138.5	false	Offutt A F B	NE	Engineer	4-5	
30 Computational Engineer (Level II or Senior)	St. Jude Children's Research Hospital	30	4.5				false	Memphis	TN	Engineer	4-5	4
31 Employee Relations Manager	Esquire Law Services	30	1				false	Nashville	TN	Manager	0-1	4
32 Director, Statistical Programming	Daiichi Sankyo, Inc.	30	3.9				false	Basking Ridge	NJ	Other	4-5	19
33 Senior Data Scientist (Remote Available)	S&S Activewear LLC	30	2.9					Bolinabrook	IL	Scientist	2-3	40
Total rows: 339 of 339 Query complete 00:00:00.229												