Module 04: Lab 01

Visual Reporting and Storytelling

Your Name

November 21, 2024

# Objectives

By the end of this lab, you will: 1. Load and analyze the **Lightcast dataset** in **Spark DataFrame**. 2. Create **five easy and three medium-complexity visualizations** using **Plotly**. 3. Explore **salary distributions, employment trends, and job postings**. 4. Analyze **skills in relation to NAICS/SOC/ONET codes and salaries**. 5. Customize **colors, fonts, and styles** in all visualizations (**default themes result in a 2.5-point deduction**). 6. Follow **best practices for reporting on data communication**.

# Step 1: Load the Dataset

import pandas as pd  
import plotly.express as px  
import plotly.io as pio  
pio.renderers.default = "vscode"  
from pyspark.sql import SparkSession  
from pyspark.sql.functions import col  
  
  
# Initialize Spark Session  
spark = SparkSession.builder.appName("LightcastData").getOrCreate()  
  
# Load Data  
df = spark.read.option("header", "true").option("inferSchema", "true").option("multiLine","true").option("escape", "\"").csv("./data/lightcast\_job\_postings.csv")  
  
# Show Schema and Sample Data  
df.printSchema()  
df.show(5)

Setting default log level to "WARN".  
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLevel(newLevel).  
25/03/26 03:22:45 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable  
25/03/26 03:22:46 WARN Utils: Service 'SparkUI' could not bind on port 4040. Attempting port 4041.  
 25/03/26 03:23:02 WARN SparkStringUtils: Truncated the string representation of a plan since it was too large. This behavior can be adjusted by setting 'spark.sql.debug.maxToStringFields'.

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only showing top 5 rows

# 1. Salary Distribution by Employment Type

* Identify salary trends across different employment types.
* **Filter the dataset**
  + Remove records where **salary is missing or zero**.
* **Aggregate Data**
  + Group by **employment type** and compute salary distribution.
* **Visualize results**
  + Create a **box plot** where:
    - **X-axis** = EMPLOYMENT\_TYPE\_NAME
    - **Y-axis** = SALARY\_FROM
  + Customize **colors, fonts, and styles** to avoid a **2.5-point deduction**.
* **Explanation:** Write two sentences about what the graph reveals.

# Your Code for 1st question here  
pdf = df.select("EMPLOYMENT\_TYPE\_NAME", "SALARY").toPandas()  
fig = px.box(pdf, x="EMPLOYMENT\_TYPE\_NAME", y="SALARY", title="Salary Distribution by Employment Type", color\_discrete\_sequence=["#636EFA"])  
fig.update\_layout(font\_family="Arial", title\_font\_size=16)  
fig.show()

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# 2. Salary Distribution by Industry

* Compare salary variations across industries.
* **Filter the dataset**
  + Keep records where **salary is greater than zero**.
* **Aggregate Data**
  + Group by **NAICS industry codes**.
* **Visualize results**
  + Create a **box plot** where:
    - **X-axis** = NAICS2\_NAME
    - **Y-axis** = SALARY\_FROM
  + Customize colors, fonts, and styles.
* **Explanation:** Write two sentences about what the graph reveals.

# Your code for 2nd question here  
  
pdf = df.select("NAICS2\_NAME", "SALARY\_FROM").toPandas()  
fig = px.box(pdf, x="NAICS2\_NAME", y="SALARY\_FROM", title=" Salary Distribution by Industry", color\_discrete\_sequence=["#636EFA"])  
fig.update\_layout(font\_family="Arial", title\_font\_size=16)  
fig.show()

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pdf = df.select("NAICS2\_NAME", "SALARY\_FROM").toPandas()  
  
# Compute average salary by industry  
avg\_salary = pdf.groupby("NAICS2\_NAME", as\_index=False)["SALARY\_FROM"].mean()  
  
# Create a bar chart using Plotly  
fig = px.bar(avg\_salary,   
 x="NAICS2\_NAME",   
 y="SALARY\_FROM",   
 title="Average Salary by Industry",   
 color\_discrete\_sequence=["#636EFA"])  
  
# Customize layout  
fig.update\_layout(font\_family="Arial", title\_font\_size=16,   
 xaxis\_title="Industry",   
 yaxis\_title="Average Salary (USD)",   
 xaxis\_tickangle=-45)  
  
fig.show()

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# 3. Job Posting Trends Over Time

* Analyze how job postings fluctuate over time.
* **Aggregate Data**
  + Count job postings per **posted date (POSTED)**.
* **Visualize results**
  + Create a **line chart** where:
    - **X-axis** = POSTED
    - **Y-axis** = Number of Job Postings
  + Apply custom colors and font styles.
* **Explanation:** Write two sentences about what the graph reveals.

# Convert Spark DataFrame to Pandas DataFrame  
pdf = df.select("POSTED").toPandas()  
  
# Convert 'POSTED' column to datetime  
pdf["POSTED"] = pd.to\_datetime(pdf["POSTED"])  
  
# Aggregate: Count job postings per posted date  
job\_posting\_trends = pdf.groupby("POSTED").size().reset\_index(name="Job Postings")  
  
# Create line chart  
fig = px.line(job\_posting\_trends,   
 x="POSTED",   
 y="Job Postings",   
 title="Job Posting Trends Over Time",   
 line\_shape="linear",   
 color\_discrete\_sequence=["#636EFA"])  
  
# Customize layout  
fig.update\_layout(font\_family="Arial", title\_font\_size=16,  
 xaxis\_title="Date Posted",   
 yaxis\_title="Number of Job Postings",   
 xaxis\_tickangle=-45)  
  
fig.show()

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# 4. Top 10 Job Titles by Count

* Identify the most frequently posted job titles.
* **Aggregate Data**
  + Count the occurrences of each **job title (TITLE\_NAME)**.
  + Select the **top 10 most frequent titles**.
* **Visualize results**
  + Create a **bar chart** where:
    - **X-axis** = TITLE\_NAME
    - **Y-axis** = Job Count
  + Apply custom colors and font styles.
* **Explanation:** Write two sentences about what the graph reveals.

# Your code for 4th question here  
# Convert Spark DataFrame to Pandas DataFrame  
pdf = df.select("TITLE\_NAME").toPandas()  
  
# Aggregate: Count occurrences of each job title  
job\_title\_counts = pdf["TITLE\_NAME"].value\_counts().reset\_index()  
job\_title\_counts.columns = ["TITLE\_NAME", "Job Count"]  
  
# Select the top 10 most frequent job titles  
top\_10\_jobs = job\_title\_counts.head(10)  
  
# Create a horizontal bar chart  
fig = px.bar(top\_10\_jobs,   
 x="Job Count",   
 y="TITLE\_NAME",   
 orientation="h",   
 title="Top 10 Job Titles by Count",  
 color\_discrete\_sequence=["#636EFA"])  
  
# Customize layout  
fig.update\_layout(font\_family="Arial", title\_font\_size=16,  
 xaxis\_title="Number of Job Postings",   
 yaxis\_title="Job Title",   
 yaxis=dict(autorange="reversed")) # Reverse y-axis for ranking order  
  
fig.show()

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# 5. Remote vs On-Site Job Postings

* Compare the proportion of remote and on-site job postings.
* **Aggregate Data**
  + Count job postings by **remote type (REMOTE\_TYPE\_NAME)**.
* **Visualize results**
  + Create a **pie chart** where:
    - **Labels** = REMOTE\_TYPE\_NAME
    - **Values** = Job Count
  + Apply custom colors and font styles.
* **Explanation:** Write two sentences about what the graph reveals.

# Your code for 5th question here  
# Convert Spark DataFrame to Pandas DataFrame  
pdf = df.select("REMOTE\_TYPE\_NAME").toPandas()  
  
# Aggregate: Count occurrences of each remote type  
remote\_type\_counts = pdf["REMOTE\_TYPE\_NAME"].value\_counts().reset\_index()  
remote\_type\_counts.columns = ["REMOTE\_TYPE\_NAME", "Job Count"]  
  
# Create a pie chart  
fig = px.pie(remote\_type\_counts,   
 names="REMOTE\_TYPE\_NAME",   
 values="Job Count",   
 title="Remote vs On-Site Job Postings",  
 color\_discrete\_sequence=px.colors.qualitative.Set2) # Custom color palette  
  
# Customize layout  
fig.update\_layout(font\_family="Arial", title\_font\_size=16)  
  
fig.show()

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# 6. Skill Demand Analysis by Industry (Stacked Bar Chart)

* Identify which skills are most in demand in various industries.
* **Aggregate Data**
  + Extract **skills** from job postings.
  + Count occurrences of skills grouped by **NAICS industry codes**.
* **Visualize results**
  + Create a **stacked bar chart** where:
    - **X-axis** = Industry
    - **Y-axis** = Skill Count
    - **Color** = Skill
  + Apply custom colors and font styles.
* **Explanation:** Write two sentences about what the graph reveals.

print(df.columns)

['ID', 'LAST\_UPDATED\_DATE', 'LAST\_UPDATED\_TIMESTAMP', 'DUPLICATES', 'POSTED', 'EXPIRED', 'DURATION', 'SOURCE\_TYPES', 'SOURCES', 'URL', 'ACTIVE\_URLS', 'ACTIVE\_SOURCES\_INFO', 'TITLE\_RAW', 'BODY', 'MODELED\_EXPIRED', 'MODELED\_DURATION', 'COMPANY', 'COMPANY\_NAME', 'COMPANY\_RAW', 'COMPANY\_IS\_STAFFING', 'EDUCATION\_LEVELS', 'EDUCATION\_LEVELS\_NAME', 'MIN\_EDULEVELS', 'MIN\_EDULEVELS\_NAME', 'MAX\_EDULEVELS', 'MAX\_EDULEVELS\_NAME', 'EMPLOYMENT\_TYPE', 'EMPLOYMENT\_TYPE\_NAME', 'MIN\_YEARS\_EXPERIENCE', 'MAX\_YEARS\_EXPERIENCE', 'IS\_INTERNSHIP', 'SALARY', 'REMOTE\_TYPE', 'REMOTE\_TYPE\_NAME', 'ORIGINAL\_PAY\_PERIOD', 'SALARY\_TO', 'SALARY\_FROM', 'LOCATION', 'CITY', 'CITY\_NAME', 'COUNTY', 'COUNTY\_NAME', 'MSA', 'MSA\_NAME', 'STATE', 'STATE\_NAME', 'COUNTY\_OUTGOING', 'COUNTY\_NAME\_OUTGOING', 'COUNTY\_INCOMING', 'COUNTY\_NAME\_INCOMING', 'MSA\_OUTGOING', 'MSA\_NAME\_OUTGOING', 'MSA\_INCOMING', 'MSA\_NAME\_INCOMING', 'NAICS2', 'NAICS2\_NAME', 'NAICS3', 'NAICS3\_NAME', 'NAICS4', 'NAICS4\_NAME', 'NAICS5', 'NAICS5\_NAME', 'NAICS6', 'NAICS6\_NAME', 'TITLE', 'TITLE\_NAME', 'TITLE\_CLEAN', 'SKILLS', 'SKILLS\_NAME', 'SPECIALIZED\_SKILLS', 'SPECIALIZED\_SKILLS\_NAME', 'CERTIFICATIONS', 'CERTIFICATIONS\_NAME', 'COMMON\_SKILLS', 'COMMON\_SKILLS\_NAME', 'SOFTWARE\_SKILLS', 'SOFTWARE\_SKILLS\_NAME', 'ONET', 'ONET\_NAME', 'ONET\_2019', 'ONET\_2019\_NAME', 'CIP6', 'CIP6\_NAME', 'CIP4', 'CIP4\_NAME', 'CIP2', 'CIP2\_NAME', 'SOC\_2021\_2', 'SOC\_2021\_2\_NAME', 'SOC\_2021\_3', 'SOC\_2021\_3\_NAME', 'SOC\_2021\_4', 'SOC\_2021\_4\_NAME', 'SOC\_2021\_5', 'SOC\_2021\_5\_NAME', 'LOT\_CAREER\_AREA', 'LOT\_CAREER\_AREA\_NAME', 'LOT\_OCCUPATION', 'LOT\_OCCUPATION\_NAME', 'LOT\_SPECIALIZED\_OCCUPATION', 'LOT\_SPECIALIZED\_OCCUPATION\_NAME', 'LOT\_OCCUPATION\_GROUP', 'LOT\_OCCUPATION\_GROUP\_NAME', 'LOT\_V6\_SPECIALIZED\_OCCUPATION', 'LOT\_V6\_SPECIALIZED\_OCCUPATION\_NAME', 'LOT\_V6\_OCCUPATION', 'LOT\_V6\_OCCUPATION\_NAME', 'LOT\_V6\_OCCUPATION\_GROUP', 'LOT\_V6\_OCCUPATION\_GROUP\_NAME', 'LOT\_V6\_CAREER\_AREA', 'LOT\_V6\_CAREER\_AREA\_NAME', 'SOC\_2', 'SOC\_2\_NAME', 'SOC\_3', 'SOC\_3\_NAME', 'SOC\_4', 'SOC\_4\_NAME', 'SOC\_5', 'SOC\_5\_NAME', 'LIGHTCAST\_SECTORS', 'LIGHTCAST\_SECTORS\_NAME', 'NAICS\_2022\_2', 'NAICS\_2022\_2\_NAME', 'NAICS\_2022\_3', 'NAICS\_2022\_3\_NAME', 'NAICS\_2022\_4', 'NAICS\_2022\_4\_NAME', 'NAICS\_2022\_5', 'NAICS\_2022\_5\_NAME', 'NAICS\_2022\_6', 'NAICS\_2022\_6\_NAME']

# Your code for 6th question here  
import pandas as pd  
import plotly.express as px  
  
# Convert Spark DataFrame to Pandas  
pdf = df.select("NAICS2\_NAME", "SKILLS\_NAME").toPandas()  
  
# Ensure correct column names exist  
print(pdf.columns)   
  
# Drop missing values in the SKILLS\_NAME column  
pdf = pdf.dropna(subset=["SKILLS\_NAME"])  
  
# Convert columns to string (if necessary)  
pdf["NAICS2\_NAME"] = pdf["NAICS2\_NAME"].astype(str)  
pdf["SKILLS\_NAME"] = pdf["SKILLS\_NAME"].astype(str)  
  
# Aggregate: Count occurrences of each skill within industries  
skill\_counts = pdf.groupby(["NAICS2\_NAME", "SKILLS\_NAME"]).size().reset\_index(name="Skill Count")  
  
# Check if data is properly grouped  
print(skill\_counts.head())  
  
# Create stacked bar chart  
fig = px.bar(skill\_counts,   
 x="NAICS2\_NAME",   
 y="Skill Count",   
 color="SKILLS\_NAME",   
 title="Skill Demand Analysis by Industry",  
 barmode="stack", # Stacked bars  
 color\_discrete\_sequence=px.colors.qualitative.Set3) # Custom color scheme  
  
# Customize layout  
fig.update\_layout(font\_family="Arial", title\_font\_size=16,  
 xaxis\_title="Industry",   
 yaxis\_title="Skill Count",  
 xaxis\_tickangle=-45,   
 legend\_title="Skill")  
  
fig.show()

Index(['NAICS2\_NAME', 'SKILLS\_NAME'], dtype='object')  
 NAICS2\_NAME \  
0 Accommodation and Food Services   
1 Accommodation and Food Services   
2 Accommodation and Food Services   
3 Accommodation and Food Services   
4 Accommodation and Food Services   
  
 SKILLS\_NAME Skill Count   
0 [\n "Ability To Meet Deadlines",\n "Manageme... 1   
1 [\n "Agile Methodology",\n "Operations",\n ... 1   
2 [\n "Agile Methodology",\n "Requirements Eli... 1   
3 [\n "Angular (Web Framework)",\n "Presentati... 1   
4 [\n "Animal Health",\n "Marketing Operations... 1

# 7. Salary Analysis by ONET Occupation Type (Bubble Chart)

* Analyze how salaries differ across ONET occupation types.
* **Aggregate Data**
  + Compute **median salary** for each occupation in the **ONET taxonomy**.
* **Visualize results**
  + Create a **bubble chart** where:
    - **X-axis** = ONET\_NAME
    - **Y-axis** = Median Salary
    - **Size** = Number of job postings
  + Apply custom colors and font styles.
* **Explanation:** Write two sentences about what the graph reveals.

# Your code for 7th question here  
  
# Convert Spark DataFrame to Pandas DataFrame  
pdf = df.select("ONET\_NAME", "SALARY\_FROM").toPandas()  
  
# Remove rows with missing salary values  
pdf = pdf.dropna(subset=["SALARY\_FROM"])  
  
# Aggregate: Compute median salary & job posting count per ONET occupation  
salary\_analysis = pdf.groupby("ONET\_NAME").agg(  
 Median\_Salary=("SALARY\_FROM", "median"),   
 Job\_Postings=("ONET\_NAME", "count")  
).reset\_index()  
  
# Create bubble chart  
fig = px.scatter(salary\_analysis,   
 x="ONET\_NAME",   
 y="Median\_Salary",   
 size="Job\_Postings",   
 title="Salary Analysis by ONET Occupation Type",   
 color="Median\_Salary",   
 color\_continuous\_scale="Blues") # Custom color scale  
  
# Customize layout  
fig.update\_layout(font\_family="Arial", title\_font\_size=16,  
 xaxis\_title="ONET Occupation",   
 yaxis\_title="Median Salary (USD)",   
 xaxis\_tickangle=-45)  
  
fig.show()

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# 8. Career Pathway Trends (Sankey Diagram)

* Visualize job transitions between different occupation levels.
* **Aggregate Data**
  + Identify career transitions between **SOC job classifications**.
* **Visualize results**
  + Create a **Sankey diagram** where:
    - **Source** = SOC\_2021\_2\_NAME
    - **Target** = SOC\_2021\_3\_NAME
    - **Value** = Number of transitions
  + Apply custom colors and font styles.
* **Explanation:** Write two sentences about what the graph reveals.

# Your code for 8th question here  
import pandas as pd  
import plotly.graph\_objects as go  
  
# Load Data  
df = spark.read.option("header", "true").option("inferSchema", "true").option("multiLine","true").option("escape", "\"").csv("./data/lightcast\_job\_postings.csv")  
  
# Show Schema and Sample Data  
df.printSchema()  
# Convert Spark DataFrame to Pandas DataFrame  
pdf = df.select("SOC\_2021\_2\_NAME", "SOC\_2021\_3\_NAME").toPandas()  
  
# Aggregate: Count the number of transitions between occupation levels  
transition\_counts = pdf.groupby(["SOC\_2021\_2\_NAME", "SOC\_2021\_3\_NAME"]).size().reset\_index(name="Value")  
  
# Create lists for Sankey diagram  
source\_labels = transition\_counts["SOC\_2021\_2\_NAME"].tolist()  
target\_labels = transition\_counts["SOC\_2021\_3\_NAME"].tolist()  
values = transition\_counts["Value"].tolist()  
  
# Combine unique labels for indexing  
all\_labels = list(set(source\_labels + target\_labels))  
label\_indices = {label: i for i, label in enumerate(all\_labels)}  
  
# Map source and target labels to numeric indices  
source\_indices = [label\_indices[label] for label in source\_labels]  
target\_indices = [label\_indices[label] for label in target\_labels]  
  
# Create Sankey diagram  
fig = go.Figure(go.Sankey(  
 node=dict(  
 pad=15,  
 thickness=20,  
 line=dict(color="black", width=0.5),  
 label=all\_labels, # Labels for nodes  
 color="lightblue"  
 ),  
 link=dict(  
 source=source\_indices, # Source indices  
 target=target\_indices, # Target indices  
 value=values # Number of transitions  
 )  
))  
  
# Customize layout  
fig.update\_layout(title\_text="Career Pathway Trends (Sankey Diagram)", font\_size=12)  
  
fig.show()

root  
 |-- ID: string (nullable = true)  
 |-- LAST\_UPDATED\_DATE: date (nullable = true)  
 |-- LAST\_UPDATED\_TIMESTAMP: timestamp (nullable = true)  
 |-- DUPLICATES: integer (nullable = true)  
 |-- POSTED: date (nullable = true)  
 |-- EXPIRED: date (nullable = true)  
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 |-- SOURCES: string (nullable = true)  
 |-- URL: string (nullable = true)  
 |-- ACTIVE\_URLS: string (nullable = true)  
 |-- ACTIVE\_SOURCES\_INFO: string (nullable = true)  
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 |-- BODY: string (nullable = true)  
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 |-- COMPANY\_RAW: string (nullable = true)  
 |-- COMPANY\_IS\_STAFFING: boolean (nullable = true)  
 |-- EDUCATION\_LEVELS: string (nullable = true)  
 |-- EDUCATION\_LEVELS\_NAME: string (nullable = true)  
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 |-- EMPLOYMENT\_TYPE\_NAME: string (nullable = true)  
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 |-- MAX\_YEARS\_EXPERIENCE: integer (nullable = true)  
 |-- IS\_INTERNSHIP: boolean (nullable = true)  
 |-- SALARY: integer (nullable = true)  
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 |-- SALARY\_FROM: integer (nullable = true)  
 |-- LOCATION: string (nullable = true)  
 |-- CITY: string (nullable = true)  
 |-- CITY\_NAME: string (nullable = true)  
 |-- COUNTY: integer (nullable = true)  
 |-- COUNTY\_NAME: string (nullable = true)  
 |-- MSA: integer (nullable = true)  
 |-- MSA\_NAME: string (nullable = true)  
 |-- STATE: integer (nullable = true)  
 |-- STATE\_NAME: string (nullable = true)  
 |-- COUNTY\_OUTGOING: integer (nullable = true)  
 |-- COUNTY\_NAME\_OUTGOING: string (nullable = true)  
 |-- COUNTY\_INCOMING: integer (nullable = true)  
 |-- COUNTY\_NAME\_INCOMING: string (nullable = true)  
 |-- MSA\_OUTGOING: integer (nullable = true)  
 |-- MSA\_NAME\_OUTGOING: string (nullable = true)  
 |-- MSA\_INCOMING: integer (nullable = true)  
 |-- MSA\_NAME\_INCOMING: string (nullable = true)  
 |-- NAICS2: integer (nullable = true)  
 |-- NAICS2\_NAME: string (nullable = true)  
 |-- NAICS3: integer (nullable = true)  
 |-- NAICS3\_NAME: string (nullable = true)  
 |-- NAICS4: integer (nullable = true)  
 |-- NAICS4\_NAME: string (nullable = true)  
 |-- NAICS5: integer (nullable = true)  
 |-- NAICS5\_NAME: string (nullable = true)  
 |-- NAICS6: integer (nullable = true)  
 |-- NAICS6\_NAME: string (nullable = true)  
 |-- TITLE: string (nullable = true)  
 |-- TITLE\_NAME: string (nullable = true)  
 |-- TITLE\_CLEAN: string (nullable = true)  
 |-- SKILLS: string (nullable = true)  
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 |-- SPECIALIZED\_SKILLS\_NAME: string (nullable = true)  
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 |-- CERTIFICATIONS\_NAME: string (nullable = true)  
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 |-- COMMON\_SKILLS\_NAME: string (nullable = true)  
 |-- SOFTWARE\_SKILLS: string (nullable = true)  
 |-- SOFTWARE\_SKILLS\_NAME: string (nullable = true)  
 |-- ONET: string (nullable = true)  
 |-- ONET\_NAME: string (nullable = true)  
 |-- ONET\_2019: string (nullable = true)  
 |-- ONET\_2019\_NAME: string (nullable = true)  
 |-- CIP6: string (nullable = true)  
 |-- CIP6\_NAME: string (nullable = true)  
 |-- CIP4: string (nullable = true)  
 |-- CIP4\_NAME: string (nullable = true)  
 |-- CIP2: string (nullable = true)  
 |-- CIP2\_NAME: string (nullable = true)  
 |-- SOC\_2021\_2: string (nullable = true)  
 |-- SOC\_2021\_2\_NAME: string (nullable = true)  
 |-- SOC\_2021\_3: string (nullable = true)  
 |-- SOC\_2021\_3\_NAME: string (nullable = true)  
 |-- SOC\_2021\_4: string (nullable = true)  
 |-- SOC\_2021\_4\_NAME: string (nullable = true)  
 |-- SOC\_2021\_5: string (nullable = true)  
 |-- SOC\_2021\_5\_NAME: string (nullable = true)  
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 |-- LOT\_OCCUPATION\_NAME: string (nullable = true)  
 |-- LOT\_SPECIALIZED\_OCCUPATION: integer (nullable = true)  
 |-- LOT\_SPECIALIZED\_OCCUPATION\_NAME: string (nullable = true)  
 |-- LOT\_OCCUPATION\_GROUP: integer (nullable = true)  
 |-- LOT\_OCCUPATION\_GROUP\_NAME: string (nullable = true)  
 |-- LOT\_V6\_SPECIALIZED\_OCCUPATION: integer (nullable = true)  
 |-- LOT\_V6\_SPECIALIZED\_OCCUPATION\_NAME: string (nullable = true)  
 |-- LOT\_V6\_OCCUPATION: integer (nullable = true)  
 |-- LOT\_V6\_OCCUPATION\_NAME: string (nullable = true)  
 |-- LOT\_V6\_OCCUPATION\_GROUP: integer (nullable = true)  
 |-- LOT\_V6\_OCCUPATION\_GROUP\_NAME: string (nullable = true)  
 |-- LOT\_V6\_CAREER\_AREA: integer (nullable = true)  
 |-- LOT\_V6\_CAREER\_AREA\_NAME: string (nullable = true)  
 |-- SOC\_2: string (nullable = true)  
 |-- SOC\_2\_NAME: string (nullable = true)  
 |-- SOC\_3: string (nullable = true)  
 |-- SOC\_3\_NAME: string (nullable = true)  
 |-- SOC\_4: string (nullable = true)  
 |-- SOC\_4\_NAME: string (nullable = true)  
 |-- SOC\_5: string (nullable = true)  
 |-- SOC\_5\_NAME: string (nullable = true)  
 |-- LIGHTCAST\_SECTORS: string (nullable = true)  
 |-- LIGHTCAST\_SECTORS\_NAME: string (nullable = true)  
 |-- NAICS\_2022\_2: integer (nullable = true)  
 |-- NAICS\_2022\_2\_NAME: string (nullable = true)  
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 |-- NAICS\_2022\_5: integer (nullable = true)  
 |-- NAICS\_2022\_5\_NAME: string (nullable = true)  
 |-- NAICS\_2022\_6: integer (nullable = true)  
 |-- NAICS\_2022\_6\_NAME: string (nullable = true)

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