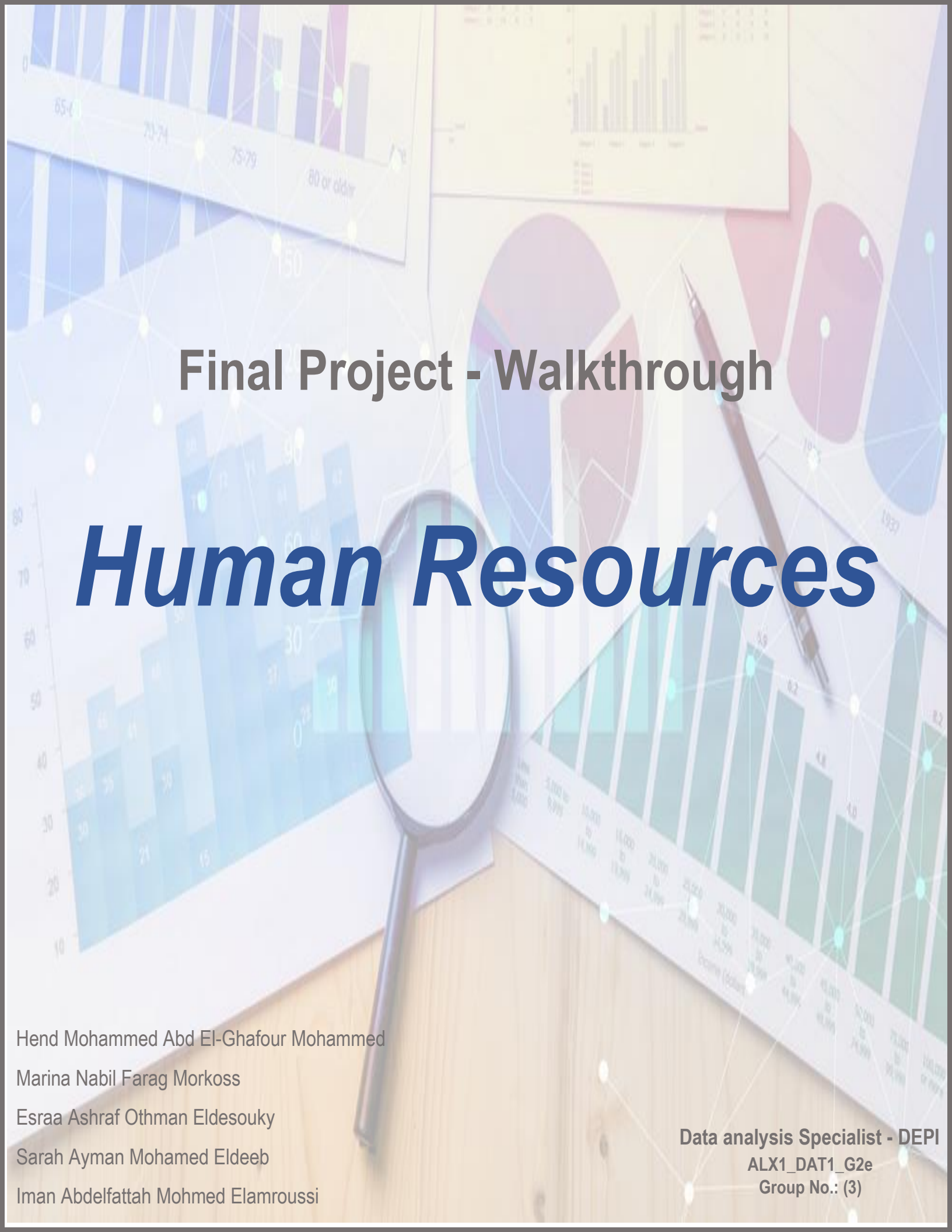

Final Project - Walkthrough

Human Resources

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Introduction

This dataset is designed to provide comprehensive insights into employee performance and satisfaction within the organization. It consists of five interrelated tables, each serving a specific purpose in analyzing various aspects of employee experience and performance metrics.

Employee Table (Employee.csv):

This foundational table contains detailed information about each employee, including personal attributes such as name, gender, and salary, as well as professional details like position and educational level. This information is critical for understanding the demographic and professional context of the workforce.

Educational Level Table (EducationLevel.csv):

This table categorizes employee educational backgrounds into five distinct levels, ranging from "No Formal Qualifications" to "Doctorate." It serves as a reference for interpreting the education level recorded in the Employee table, facilitating analysis of how educational attainment correlates with performance and satisfaction.

Performance Rating Table (PerformanceRating.csv):

This table captures performance evaluations across several dimensions, including Environment Satisfaction, Job Satisfaction, Relationship Satisfaction, Work-Life Balance, Self-Rating, and Manager Rating. Each of these metrics is rated on a scale of 1 to 5, enabling a qualitative assessment of employee performance and satisfaction.

Satisfied Level Table (SatisfiedLevel.csv):

This table categorizes employee satisfaction into five distinct levels, ranging from "Very Dissatisfied" to "Very Satisfied." It serves as a reference for interpreting the satisfaction ratings recorded in the Performance Rating table.

Rating Table (RatingLevel.csv):

Similar to the Satisfied Level Table, this table provides definitions for performance ratings, ranging from "Unacceptable" to "Above and Beyond." This allows for a standardized assessment of employee performance based on managerial evaluations.

Integration:

By linking the Performance Rating table with the Satisfied Level and Rating tables, this dataset enables a nuanced analysis of how employee perceptions of their work environment and self-assessments align with managerial evaluations.

Overall, this dataset is a valuable resource for understanding employee dynamics, assessing satisfaction levels, and identifying areas for improvement within the organization. Through careful analysis, it can inform strategies aimed at enhancing employee engagement, productivity, and overall workplace satisfaction.

Dataset Description & necessary Descriptive Statistics:

1. Employee.csv:

- Shape = (1470, 23)
- No Null Values
- No Duplicated Values
- Time period 11 years from (03-01-2012 :31-12-2022)
- **Columns Description:**

Column	Data Type	Description
EmployeeID	Str	– Key Identifier (Unique Values) – 1,470 Employee
FirstName	Str	–
LastName	Str	–
Gender	Str	– Consists of 4 categories: (Female, Male, Non-Binary, Prefer Not To Say)
Age	Int64	– Ranging from 18: 51 years *(better to create age groups for smoother investigation)*
BusinessTravel	Str	– Consists of 3 categories (Some Travel, 'No Travel ', "Frequent Traveller") ***Note:*** ➢ There is an extra space after **"No Travel"** that needs to be handled ➢ **"Frequent Traveller"** spelled incorrectly and needs to be handled ➢ refers to trips or travel an employee undertakes on behalf of the company for work-related purposes.
Department	Str	– Consists of 3 categories: (Sales, Human Resources, Technology)
DistanceFromHome (KM)	int64	– Ranging from 1:45 KM ***Note:*** Refers to the total distance, measured in kilometers, between an employee's place of residence and their primary workplace or office location. This measurement typically reflects the most common or direct route used for daily travel between home and work.
State	Str	– 3 abbreviated US States: (IL, CA, NY)

Column	Data Type	Description
Ethnicity	Str	– Consists of 7 categories: (White, Asian or Asian American, Mixed or multiple ethnic groups, Black or African American, Native Hawaiian, 'Other ','American Indian or Alaska Native) ***Notes:*** ➢ There is an extra space after **"Other"** that needs to be handled ➢ Ethnicity (including Race): A classification that encompasses both racial and ethnic groups, identifying individuals based on shared physical characteristics, ancestry, cultural heritage, or geographic origin. ➢ In reviewing the dataset, I found that these categories are currently labeled under **'Ethnicity.'** However, these categories primarily represent racial classifications rather than ethnic groups. To ensure clarity and accuracy, it would be more appropriate to relabel this field as **'Race' or 'Race and Ethnicity'** to reflect the nature of the data properly.
Education	Int64	– Ranging from 1:5 *(Foreign key of EducationLevel table Primary Key)*
EducationField	Str	– Consists of 9 categories: (Marketing, 'Marketing ', Computer Science, Technical Degree, Information Systems, Other, Economics, Human Resources, Business Studies) ***Note:*** There is an extra space after **"Marketing"** that needs to be handled ***(causing redundancy)***
JobRole	Str	– Consists of 13 categories: (Sales Executive, HR Business Partner, Engineering Manager, Recruiter, Data Scientist, Machine Learning Engineer, Manager, Software Engineer, Senior Software Engineer, Sales Representative, Analytics Manager, HR Executive, HR Manager) ***Note:*** ➢ There is 1 job role **"Sales Executive"** that is categorized as a **"Technology"** Department instead of **"Sales"** Department that needs to be handled ➢ After investigation we found that this employee was white, recently hired (1 year) & with a high salary ($319,619 / year)
MaritalStatus	Str	– Consists of 3 categories: (Divorced, Single, Married)
Salary	Int64	– Ranging from $20,387: $547,204 ***Note:*** There is a gap of more than $500,000 between the lower and higher salaries, which may be due to differences in experience, job roles, or compensation policies. This discrepancy requires further investigation to determine its cause.
StockOptionLevel	Int64	– Ranging from 0:3 ***Note:*** Refers to the tier or extent of stock options granted to an employee as part of their compensation package. Stock options give employees the right to purchase a certain number of companies shares at a predetermined price, typically lower than the market value, after a specified period or based on performance milestones.

Column	Data Type	Description
OverTime	Str	– Consists of 2 categories: (No, Yes) ***Note:*** Refers to the additional hours worked by an employee beyond their regular working schedule, typically leading to extra compensation. The specifics of overtime—such as when it starts and how much extra pay it involves—are often governed by company policy or labor laws. In most cases, overtime pay is higher than regular hourly wages, usually calculated at 1.5 times the standard rate (referred to as "time and a half").
HireDate	Object	– Starts from 03-01-2012: 31-12-2022 ***(11 Years)***
Attrition	Str	– Consists of 2 categories: (No, Yes) ***Notes:*** ➢ Refers to the gradual reduction of a company's workforce overtime due to resignations, retirements, or employees leaving voluntarily, without their positions being replaced immediately. It differs from layoffs or firings, as attrition is typically unplanned and occurs naturally. ➢ In the dataset, "Attrition" may indicate the rate at which employees are leaving the organization or could be used to flag employees who have left. Understanding attrition is essential for assessing workforce stability and planning for future hiring needs.
YearsAtCompany	Int64	– Ranging from 0:10 years ***Note:*** ➢ The total number of years an employee has worked for the company, starting from their hire date. ➢ A value of ***0*** years indicates that the employee's working period is less than one year.
YearsInMostRecentRole	Int64	– Ranging from 0:10 years ***Note***: ➢ The time an employee has spent in their current job or position, starting from the date they were promoted or transferred to their most recent role. ➢ A value of ***0*** years indicates that the time spent in this position is less than one year.
YearsSinceLastPromotion	Int64	– Ranging from 0:10 years ***Note***: ➢ The time that has passed since the employee received their last promotion or moved to a higher position within the company. ➢ A value of ***0*** years indicates that the last promotion occurred less than a year ago.
YearsWithCurrManager	Int64	– Ranging from 0:10 years ***Note***: ➢ The number of years the employee has worked under their current direct supervisor or manager, starting from when that reporting relationship was established. ➢ A value of ***0*** years indicates that the employee has been working under the current manager for less than a year.

The descriptive statistics showed:

- 75% of employees are 34 years old or younger, as indicated by the 75th percentile (34).
- The distance appears to follow a relatively normal distribution, given the symmetry between the mean (23) and the percentiles (22 at 50% and 33 at 75%).
- There is a significant gap in salaries, suggesting possible outliers, with the maximum salary ($547,204) being much higher than the 75th percentile ($142,056) and the mean ($112,956). (The data was right skewed when visualized with a large number of outliers raising concerns about fairness in salary distribution. And with more investigation found that those outliers are mostly distributed among Managers & Seniors)
- 75% of employees have been working at the company for 7 years or less, as indicated by the 75th percentile (7).
- 75% of employees were transferred within the last 4 years or less, as indicated by the 75th percentile (4).
- 75% of employees have not received a promotion in 6 years or less, as indicated by the 75th percentile (6).
- 75% of employees have worked under their current manager for 4 years or less.

2. EducationLevel.csv

- Shape = (5, 2)
- No Null Values
- Columns Description:

Column	Data Type	Description
EducationLevelID	int64	– Key Identifier (Primary Key for Education foreign key @ Employee table) – Ranging from 1:5
EducationLevel	Str	– Consists of 5 Categories: (No Formal Qualifications, 'High School ', 'Bachelors ', 'Masters ', Doctorate) ***Notes:*** ➢ There is an extra space after 'High School ', 'Bachelors ', 'Masters ' that needs to be handled ➢ The data is organized as follows: ▪ 1 → No Formal Qualifications ▪ 2 → High School ▪ 3 → Bachelors ▪ 4 → Masters ▪ 5 → Doctorate

3. PerformanceRating.csv

- **Performance Rating** typically refers to an assessment of the **employee's performance** by the company. It reflects how well an employee has met their job responsibilities, goals, and expectations over a specific period (often during performance reviews). *And also reflects the employees' level of satisfaction*
- Shape = (6709,11)
- No Null Values
- No Duplicated Values
- **Columns Description:**

Column	Data Type	Description
PerformanceID	Object	– Key Identifier
EmployeeID	Str	– Foreign key *(Referencing EmployeeID in Employee table)* – Rating of 1,280 Employee ***Note:*** ➢ An employee could be rated & could be given opportunities multiple times ➢ Need to investigate the reason for not including all the employees for rating (# Employees = 1470)
ReviewDate	Object	– The date of performing the review ***Note:*** The data type of this column is not identified correctly
Environment Satisfaction	Int64	– Ranging from 1:5 (Foreign Key referencing SatisfactionID in SatisfiedLevel Table) ***Note:*** Refers to an **employee's level of satisfaction** with their work environment. This includes physical and organizational aspects of the workplace
JobSatisfaction	Int64	– Ranging from 1:5 (Foreign Key referencing SatisfactionID in SatisfiedLevel Table) ***Note:*** It reflects how happy or fulfilled employees feel in their role, and it's a key indicator of employee morale and engagement. High job satisfaction generally leads to higher productivity, lower turnover, and better organizational performance.
Relationship Satisfaction	Int64	– Ranging from 1:5 (Foreign Key referencing SatisfactionID in SatisfiedLevel Table) ***Note:*** Refers to an employee's level of satisfaction with the **interpersonal relationships** they have in the workplace. *This can include:*Relationships with colleagues, relationship with supervisors or managers, & team dynamics
TrainingOpportunities WithinYear	Int64	– Ranging from 1:3 ***Note:*** The total number of training opportunities provided by the company to the employee during the year.
TrainingOpportunities Taken	Int64	– Ranging from 0:3 ***Note:*** The total number of training opportunities that the employee has participated in during the year.
WorkLifeBalance	Int64	– Ranging from 1:5 (Foreign Key referencing SatisfactionID in SatisfiedLevel Table) ***Note:*** ➢ Refers to the employee's ability to balance work responsibilities with personal life in a way that minimizes stress and promotes well-being. ➢ In HR records, this reflects how well an employee feels they are managing their job demands alongside their personal life, contributing to overall job satisfaction and productivity.

Column	Data Type	Description
SelfRating	Int64	– Ranging from 3:5 (Foreign Key referencing Rating ID in RatingLevel Table) ***Note:*** ➢ Refers to an employee's self-assessment of their own performance or satisfaction in their role. This rating is typically part of a performance evaluation process and allows employees to reflect on their strengths, areas for improvement, and overall contributions to the organization. ➢ Self-Rating column would capture the score given by the employee themselves regarding their performance, which can be compared to the Manager Rating to assess alignment or discrepancies between self-perception and managerial evaluation.
ManagerRating	Int64	– Ranging from 2:5 (Foreign Key referencing Rating ID in RatingLevel Table) ***Note:*** Refers to the assessment or evaluation given by a manager regarding an employee's performance. This rating is typically part of a formal performance review process and reflects the manager's perspective on the employee's work, contributions, and adherence to company standards.

The descriptive statistics showed:

- Environment Satisfaction, Job Satisfaction, Relationship Satisfaction, Work-Life Balance, Self-Rating, and Manager Rating are all rated on a scale from 1 to 5, while Training Opportunities Within Year and Training Opportunities Taken are counted between 0 to 3.

- Satisfaction Ratings (Environment, Job, Relationship):
  The majority of employees report moderate to high satisfaction, with the median (50%) ratings being 3 or 4. Around 75% of employees have at least 3 or 4 in these categories, suggesting that most employees feel reasonably satisfied in these areas.

- Training Opportunities:
  Most employees have had between 1 to 3 training opportunities within the year, with a median of 2 opportunities. However, it appears that many employees have only taken 0 or 1 of these opportunities (median is 1), indicating that employees may not be utilizing all the training offered.

- Work-Life Balance:
  The average employee's work-life balance is also rated around 3, with a slight skew toward the higher end (75% rate it 4 or 5).

- Self and Manager Ratings:
  Self Rating has a median of 4, meaning most employees rate themselves slightly above average. Meanwhile, the Manager Rating median is 3, indicating managers rate employees as average performers.

- Statistical Observations:
  - The standard deviation is mostly low (especially for Environment Satisfaction, Training Opportunities, Self-Rating, and Manager Rating), meaning there is little variation among responses, except for Job Satisfaction and Relationship Satisfaction where the spread is slightly larger.
  - The minimum values suggest that some employees have the lowest satisfaction or have not taken any training, but the overall median and upper quartile indicate more positive feedback across the board.

4. SatisfiedLevel.csv

- **Satisfaction Levels** refer to the employee's satisfaction with the company.
- Shape = (5, 2)
- No Null Values
- No Duplicated Values
- Columns Description:

Column	Data Type	Description
SatisfactionID	int64	– Key Identifier *(Primary Key for PerformanceLevel table – Satisfaction Columns)* – Ranging from 1:5
SatisfactionLevel	Str	– Consists of 5 Categories: (Very Dissatisfied, Dissatisfied, Neutra', 'Satisfied ', Very Satisfied) ***Notes:*** ➢ There is an extra space after 'Satisfied ' that needs to be handled ➢ The data is organized as follows: ▪ 1 → Very Dissatisfied ▪ 2 → Dissatisfied ▪ 3 → Neutral ▪ 4 → Satisfied ▪ 5 → Very Satisfied

5. RatingLevel.csv

- Shape = (5, 2)
- No Null Values
- No Duplicated Values
- Columns Description:

Column	Data Type	Description
RatingID	int64	– Key Identifier – Ranging from 1:5
RatingLevel	Str	– Consists of 5 Categories: (Unacceptable, Needs Improvement, Meets Expectation, 'Exceeds Expectation ', Above and Beyond) ***Notes:*** ➢ There is an extra space after 'Exceeds Expectation ' that needs to be handled ➢ The data is organized as follows: ▪ 1 → Unacceptable ▪ 2 → Needs Improvement ▪ 3 → Meets Expectation ▪ 4 → Exceeds Expectation ▪ 5 → Above and Beyond

Preprocessing Phase:

A) Data cleaning (using Python):

1- Employee.csv:

- Renaming Columns to be handled easily.
- Made sure the Hire Date Data type is date *(Changed the date format using "to_datetime" Function)*
- Edited some of the columns' values *(Removed extra spaces & incorrect spelling)*
- Correcting the classification of "Sales Executive" Department *(Replaced Technology with Sales in the Department column)*
- Arranged columns.
- Created age, Distance, & Salary Groups
- Divided the table into two tables:
  - Employee Information (Includes all the employees' personal details)
  - Work Profile (Includes all the employees' work-related details)

2- EducationaLevel.csv:

- Renaming Columns to be handled easily
- Edited some of the columns' values *(Removed extra spaces)*

3- PerformanceRating.csv

- Renaming Columns to be handled easily
  - Checking the Data type of Review_Date *(Changed the date format using "to_datetime" Function)*

4- SatisfiedLevel.csv

- Renaming Columns to be handled easily
- Edited some of the columns' values *(Removed extra spaces)*

5- RatingLevel.csv

- Renaming Columns to be handled easily
- Edited some of the columns' values *(Removed extra spaces)*

B) Transferring tables to SQL

1- HR – Final Project.sql

- Adjusted the data types of each table in order to assign Primary & Foreign Keys easily
- Assigned Primary & Foreign Keys for smooth Diagram creation
- Created HR Diagram in order to connect the tables with each other
- Created the necessary views:
  - Inserting Education level column into the Employee Information table
  - Replacing the Satisfaction & Rating Indicators in the Performance Rating table
  - Working Profile Table:
    - Adding the total Number of evaluations made to each Employee & checking whether they are evaluated or not
    - Calculated the Hiring Year & the Attrition year

Data Analysis Questions (Using Python):

Performing initial investigation to extract the suitable questions that are needed to be asked

- **Employee Information Table:**
  - The dataset includes the following gender distribution:
    - 675 Female employees, representing 45.92%
    - 651 Male employees, representing 44.29%
    - 124 Non-Binary employees, representing 8.44%
    - 20 employees who prefer not to disclose their gender, representing 1.36%
  - The dataset recorded the following age distribution:
    - 650 employees aged 18–25 years ("Youth"), representing 44.22%
    - 476 employees aged 26–34 years ("Young Adult"), representing 31.77%
    - 263 employees aged 35–44 years ("Adult"), representing 17.89%
    - 90 employees aged 45–51 years ("Mature Adult"), representing 6.12%
  - The majority of employees are White (860), representing 58.5%, followed by Black or African American employees (207), representing 14.08%. Mixed or multiple ethnic groups account for 198 employees (13.47%), while Asian or Asian American employees make up 113 (7.69%). Additionally, there are 50 American Indian or Alaska Native employees (3.4%), 26 Native Hawaiian employees (1.77%), and 16 employees classified as Other (1.09%). ***These figures raise potential concerns about racial diversity in the hiring process.***
  - The dataset recorded the following marital status distribution:
    - 624 employees are married, representing 42.45%
    - 549 employees are single, representing 37.35%
    - 297 employees are divorced, representing 20.20%
  - The dataset recorded the following educational qualifications:
    - 572 employees hold a Bachelor's degree, representing 38.91%
    - 398 employees hold a Master's degree, representing 27.07%
    - 282 employees hold a High School diploma, representing 18.19%
    - 170 employees have no formal qualifications, representing 11.56%
    - 48 employees hold a Doctorate degree, representing 3.27%
  - Computer Science and Information Systems represent the largest educational backgrounds, with 440 employees (29.93%) and 363 employees (24.69%), respectively, followed by Marketing, with 325 employees (22.11%). ***This suggests that the company operates within a technology-related industry.***
  - The dataset recorded the following employee locations:
    - 875 employees are based in California, representing 59.52%
    - 419 employees are based in New York, representing 28.50%
    - 176 employees are based in Illinois, representing 11.97%

- The distance from home to work for employees is as follows:
  - 396 employees live within 1–12 KM ("Short Distance"), representing 26.94%
  - 349 employees live within 13–22 KM ("Moderate Distance"), representing 23.74%
  - 362 employees live within 23–33 KM ("Long Distance"), representing 24.63%
  - 363 employees live within 34–45 KM ("Very Long Distance"), representing 24.69%

Work Profile Table:

- The dataset recorded the following departmental distribution:
  - 961 employees work in the Technology Department, representing 65.37%
  - 446 employees work in the Sales Department, representing 30.34%
  - 63 employees work in the HR Department, representing 4.29%

This indicates that the company operates within a technology-related industry.

- The Sales Executive position is held by 327 employees. With 446 employees in the Sales department, ***this indicates that the majority of this department consists of Sales Executives, reinforcing the company's industry focus.*** This is followed by technical positions, Sales Representatives, Managers, and HR roles.

- The dataset recorded the following Salary Levels distribution:
  - 810 employees' salaries are in the range of 20,387 - 80,000 USD/year ("Low"), representing 55.1%.
  - 292 employees' salaries are in the range of more than 80,000 - 142,056 USD/year ("Medium"), representing 19.86%.
  - 118 employees' salaries are in the range of more than 142,056 - 200,000 USD/year ("High"), representing 8.03%.
  - 126 employees' salaries are in the range of more than 200,000 - 290,773 USD/year ("Very High"), representing 8.57%.
  - 124 employees' salaries are in the range of more than 290,773 - 547,204 USD/year ("Extra High (Outliers)"), representing 8.44%.

There is a significant gap in salaries, suggesting possible outliers, with the maximum salary ($547,204) being much higher than the 75th percentile (142,056 USD) and the mean (112,956 USD). The data was right-skewed when visualized, with a large number of outliers raising concerns about fairness in salary distribution. Further investigation revealed that these outliers are mostly distributed among Managers and Senior employees.

- The dataset recorded the following Total number of hired employees / year as follows:
  - The minimum number of hires was in 2017, with 106 employees hired.
  - The maximum number of hires was in 2022, with 155 employees hired.
  - This was followed by 151 employees hired in 2012.

The peak occurred at the start and the end of the investigated period.

- 190 employees started working at the company in the past year, representing the highest number. ***This increase is attributed to the large hiring process conducted in 2022.***

- 13 employees did not get transferred or promoted during the investigated period.

- 38 Employee Didn't get promoted during the investigated period
- 14 employees have been working under the same manager for 10 years.
- 416 employees are working overtime, representing 28.30%.
- The majority of employees engage in some travel, with 1,043 employees (70.95%), followed by frequent travelers (277 employees, 18.84%) and those who do not travel (150 employees, 10.2%).
- The dataset recorded the following information:
  - 631 employees are not granted equity shares, representing 42.93%.
  - 596 employees are granted level 1 shares, representing 40.54%.
  - 158 employees receive level 2 shares, representing 10.75%.
  - 85 employees are granted level 3 shares, representing 5.78% (the highest equity level).
- 237 Employees have left the company, representing 16.12%. ***Also, All the resigned employees were rated either for 9 or 10 times before leaving the company***
- The year 2021 recorded the highest turnover, with 60 employees leaving the company, followed by 2022 with 54 employees leaving and 2020 with 32 employees leaving. ***The number of resigned employees is increasing across the years.***

- **Performance Rating Table:**

- There were 6,709 performance ratings conducted on 1,280 employees. Out of a total of 1,470 employees, only 1,280 were evaluated (each employee could be rated multiple times and granted training opportunities more than once). ***Further investigation revealed that all employees who had no performance ratings had been with the company for a year or less.***
- The number of opportunities offered to employees is increasing each year, reaching its maximum in 2022 with a total of 2,288 opportunities.
- Additionally, the number of opportunities taken by employees is also increasing each year, reaching its maximum in 2022 with a total of 1,064 opportunities.

The gap between the opportunities offered by the company and the opportunities taken is increasing each year.

Questions to be asked:

- **Gender Analysis:**
  - Which gender represent the highest count of hired employees?
  - Which gender represent the highest turnover ratio?
  - Which gender has the highest count of employees have doctorate?
  - Which gender get the highest average salary?
  - What's the highest manager rating for each gender?
  - Which state hired the highest count of employees and from which gender?
  - Which department include the highest count of employees and from which gender?
  - How many employees' own shares in the company and how many share granted for each gender?
- **Race Analysis:**
  - Which race has the highest Hiring count yearly?
  - Which race get the highest average salary?
  - What is the count of each race in the department?
  - Which race represent the highest managerial rating?

Demographics and Personal Information

- Is the equity grant depends on the education level?
- Is the equity grant depends on manager rating?
- What's the highest level of equity grant based on count of employees?
- Is there relation between age stage and the salary?
- which race has the highest average salary?
- which race has the highest count of employees turned over?
- which marital status has the highest count of employees turned over?
- which education level get the highest average salary?
- which education level has the highest count of employees turned over?
- Which state has the highest count of employees turned over?
- which state has the highest average salary?
- Is there relation between distance level and the turnover?

- **Work Profile**
  - Does department affect salary distribution?
  - How does position influence salary levels across the organization?
  - Is there a relationship between overtime and salary?
  - What impact does equity grant have on employees' Salaries among Positions?
  - What is the impact of business travel on salary levels?
  - Is there a relationship between overtime and turnover?
  - Does business travel correlate with a higher turnover rate?
  - What impact does equity grant have on employee turnover?
  - How does tenure correlate with turnover?
  - How does the promotion gap affect an employee's likelihood of turnover?
  - What is the relationship between manager tenure and turnover?
  - How do salary level and promotion gap relate to the likelihood of an employee leaving the company?
  - How do the rates of turnover compare to hiring rates per year?
  - What has led to the sudden increase in turnover in the last 2 years?
- **Opportunities and Growth**
  - How is the distribution of opportunities segmented among departments, positions, states, and gender?
  - How are opportunities offered and taken distributed according to race?
  - Why did some employees not take advantage of the training opportunities offered to them?
  - Is there a correlation between the promotion gap, role tenure, and the number of training opportunities taken?
  - How does the combination of training opportunities and manager tenure impact employee retention?
  - How does the number of training opportunities taken per year relate to employee turnover?
  - Does the number of training opportunities per year influence an employee's salary growth?
  - How does the number of training opportunities correlate with job satisfaction and environment satisfaction?
  - What is the relationship between opportunities taken and employee satisfaction levels?

- **Satisfaction and Performance**
  - How do job satisfaction level and environment satisfaction level relate to turnover?
  - Does a higher relationship satisfaction level reduce turnover?
  - Is there a connection between work-life balance and employee retention?
  - How does self-rating correlate with salary?
  - What is the effect of manager rating on both salary and turnover?
  - Are employees with higher work-life balance more likely to stay with the company?
  - How does overall performance (manager rating, self-rating, and satisfaction levels) impact salary?
  - What is the performance rating of employees who have not been transferred or promoted for a long period?
  - Are there differences in performance ratings based on race or gender?
  - How often are employees rated more than once, and how does this affect their opportunities and promotions?
- **Predictive Analysis:**
  - What is the expected salary over the next 5 years ***(overall & across departments)***?
  - What is the expected number of hired employees over the next 5 years ***(overall & across departments)***?
  - What is the expected number of employees leaving the company over the next 5 years ***(overall & across departments)***?
  - How many opportunities are expected to be offered to employees, and how many are expected to be taken by them over the next 5 years ***(overall & across departments)***?

Visualization Dashboard:

- Created a set of dashboards addressing the above questions using Tableau as follows:
  - Gender Analysis Dashboard
  - Race Analysis Dashboard
  - Demographics & Work Profile Dashboard
  - Growth & Performance Dashboard
  - Forecasting Analysis

Insights:

Gender Analysis:

Executed by: Marina Nabil Farag Morkoss

Note:

This dashboard was created to measure the possibility of bias existence in gender

- Females represent (46%) of total hired employees.
- Males represent the highest count of turnover (114).
- Males represent the highest count of employees have doctorate (23) in the different departments and they get the lowest average salary (136,050), while (4) non binary have doctorate in the different departments and they get the highest average salary (182,481).
- The highest count of employees from females (456), males (428), non -binary (88), and prefer not to say (13) their manager rating is (meets expectation).
- (CA) state has the highest count of employees (875) and females represent (47%) of total hired employees in this state.
- (Technology) department includes the highest count of employees (960) and females represent (45.5%) of total hired employees in this department.
- (42) female, (34) male, (8) non binary and (2) prefer not to say, have (no formal qualification) and own shares.
- (389) female represents “58% of total females” own (537) share,
- (378) male represents “58% of total males” own (528) share,
- (63) non- binary represents “51% of total non-binary” own (91) share,
- (9) prefer not to say - represents “45% of total prefer not to say” own (11) share.
- (53) female, (49) male, (10) non binary and (3) prefer not to say, had no manager rating and own shares.
- The highest count of employees owns (1) share is (280) female, (267) male, (41), (8) prefer not to say

Race Analysis:

Executed by: Iman Abdelfattah Mohmed Elamroussi

Note:

This dashboard was created to measure the possibility of bias existence in Race

- white employees have the highest hiring rate in each year from 2012 until 2022.
- White employees have been counted the most in the salary range of 'extra_high', 'very_high', 'Medium' and 'low'.
- In the technology department, the white employees have dominated the department with count of 567 followed by the black and African American with count of 142. In the sales department, the white employees were the highest number of 263 followed by mixed ethnic groups 66. In the human resources department, white employees are 30 as the highest and ethnic groups 12.
- Regarding the managerial rating, the white employees are the highest in each rating, either good or bad, exceeding any other race.

Demographics & Personal Information Analysis:

Analysis & Visualization: Marina Nabil Farag Morkoss

Dashboard: Hend Mohammed Abd El-Ghafour

- The highest average salary (245,126) for "Adult" (age range 35-44)"
- The highest average salary (154,197) for "White".
- The highest employees turned over are "white" (137).
- The highest count of employees turned over are single (128).
- The highest average salary (154,269) for employees has "Doctorate".
- The highest employees turned over have "Bachelors" (99).
- The highest count of employees turned over (153) in "California" (CA) state.
- The highest count of employees turned over (64) their distance level "Short"

Work Profile:

Executed by: Hend Mohammed Abd El-Ghafour

- The average salaries in the HR and Sales departments are close to each other at $119K, followed by Technology at $109K.

- Salary levels / Positions:
  - Extra high salaries are concentrated among managers in all departments.
  - As salary levels decrease, the age of employees also tends to decrease.
  - Manager salaries range between extra high and medium levels.
  - Senior Software Engineers, Sales Executives, and HR Executives have salaries ranging from very high to low, with a small portion earning extra high salaries.
  - Lower-level positions mainly receive low salaries, with some earning medium-level salaries.
  - As salary levels decrease, the average employee age also decreases, likely due to less experience.

- Overtime analysis revealed no clear relationship or consistent pattern between overtime and salary distribution.

- Equity and salary analysis by department:
  - In the HR department, employees with level 3 equity shares received the highest average salary of $170K.
  - In the Sales department, the highest average salary was $132K for employees with level 3 equity.
  - In the Technology department, the highest salary ($190K) was paid to employees with level 1 shares.
  - There is no consistent pattern between salary and the level of granted shares.

- The impact of Business Travel on Salaries across salaries levels:
  - *Extra High Level:*
    - Frequent travelers (25 employees - Average salary: $376.5K - Max salary: $547.2K - Min salary: $293.4K)
    - Some travel (90 employees - Average salary: $374.4K - Max salary: $540K - Min salary: $290.8K)
    - No travel (9 employees - Average salary: $403.6K *"highest"* - Max salary: $542.7K - Min salary: $316.7K)
  - *Very High Level:*
    - Frequent travelers (23 employees - Average salary: $243.3K - Max salary: $288.5K - Min salary: $200.4K)
    - Some travel (91 employees - Average salary: $238.8K - Max salary: $287.7K - Min salary: $200.4K)
    - No travel (12 employees - Average salary: $254.2K *"highest"* - Max salary: $283.1K - Min salary: $218.4K)
  - *High Level:*
    - Frequent travelers (20 employees - Average salary: $174.8K *"highest"* - Max salary: $199.7K - Min salary: $142.5K)
    - Some travel (87 employees - Average salary: $169.6K - Max salary: $197.6K - Min salary: $142.1K)
    - No travel (12 employees - Average salary: $165.5K - Max salary: $193.3K - Min salary: $149.5K)
  - *Medium Level:*
    - Frequent travelers (50 employees - Average salary: $106.8K *"highest"* - Max salary: $140.5K - Min salary: $81.7K)
    - Some travel (212 employees - Average salary: $104.9K - Max salary: $142K - Min salary: $80.2K)
    - No travel (30 employees - Average salary: $106.1K - Max salary: $139K - Min salary: $82.1K)
  - *Low Level:*
    - Frequent travelers (159 employees - Average salary: $48.3K - Max salary: $80K - Min salary: $21.9K)
    - Some travel (563 employees - Average salary: $46.4K - Max salary: $79.8K - Min salary: $20.4K)
    - No travel (88 employees - Average salary: $49.1K *"highest"* - Max salary: $79.3K - Min salary: $21.5K)

- The impact of overtime on turnover:
  - In 2014, 5 out of 10 resigned employees were doing overtime.
  - In 2015, 7 out of 11 resigned employees were doing overtime.
  - In 2016, 7 out of 12 resigned employees were doing overtime.
  - In 2017, 7 out of 14 resigned employees were doing overtime.
  - In 2018, 9 out of 21 resigned employees were doing overtime.
  - In 2019, 13 out of 21 resigned employees were doing overtime.
  - In 2020, 15 out of 32 resigned employees were doing overtime.
  - In 2022, 34 out of 54 resigned employees were doing overtime.

- Resigned Employees and Travel:
  - 65.82% of resigned employees conducted some travel.
  - 29.11% of resigned employees were frequent travelers.
  - Only 5.06% of resigned employees had no travel duties.

- The majority of resigned employees did not receive any equity, and the percentage of resigned employees decreases as the level of granted shares increases:
  - 64% of resigned employees were granted no shares.
  - 23.63% of resigned employees were granted level 1 shares.
  - 6.33% of resigned employees were granted level 3 shares.
  - 5.06% of resigned employees were granted level 2 shares.

- Resignation Timing:
  - 25.74% of employees resigned after 1 year of employment, while 25.32% resigned after less than a year.
  - 59.07% of employees resigned after less than a year of employment, followed by 19.41% after 1 year.
  - 48.10% of employees who were not promoted resigned after less than a year, followed by 21.91% after 1 year.
  - 55.27% of employees resigned after working under the same manager for less than a year, followed by 21.52% after one year.

- Turnover vs. Promotion Gap and Salary Level
  - The majority of resigned employees were not promoted for one or less than a year and were categorized under the low salary level. The highest resignation rates occurred in the Technology department, followed by Sales & HR.
  - A longer promotion gap is correlated with higher turnover rates, but this conclusion seems inconsistent and requires deeper investigation to validate.
  - A clear negative relationship exists between salary and turnover rates: as salary levels increase, the number of resignations decreases, indicating that higher salaries are linked to better retention.

- Hiring & Resignation Patterns:
  - The number of hired employees has shown an inconsistent pattern across years, peaking in 2022 with 155 employees and 2012 with 151 employees, while the lowest number was recorded in 2017 with 106 employees. This suggests fluctuations in hiring needs or company growth.
  - Resignation rates have been on the rise, reaching a maximum of 60 employees in 2021, followed by a slight decrease to 54 employees in 2022. This rise in resignations aligns with shorter tenure, role tenure, promotion gap & manager tenure periods (less than a year to 1 year), highlighting potential dissatisfaction linked to low salaries.

- There is no clear correlation between the number of hires and resignations, meaning it cannot be conclusively stated that hiring was aimed at replacing resigned employees. This could indicate other factors driving recruitment, such as company expansion or skill demand changes, rather than mere replacement.

Opportunities & Growth Analysis:

Executed by: Sarah Ayman Mohamed Eldeeb

- Opportunities Distribution:
  - Training opportunities are unevenly distributed, with technology and sales departments seeing the most engagement. Female employees take more opportunities.
- Opportunities and Race:
  - White employees take most training opportunities, while participation among Asian American and mixed ethnic groups is lower despite similar offerings.
- Missed Training Opportunities:
  - Tech employees often miss training due to workload and lack of managerial support. Employees with lower job satisfaction also tend to skip training.
- Promotion Gap and Tenure:
  - Longer-tenured employees without recent promotions tend to take fewer training opportunities, indicating possible disengagement.
- Manager Tenure and Retention:
  - Employees with longer manager relationships and more training are more likely to stay, while shorter tenures and fewer opportunities increase attrition.
- Training and Turnover:
  - More training (3+ opportunities annually) correlates with lower turnover rates, while fewer training opportunities increase the likelihood of leaving.
- Training and Salary Growth:
  - Employees who regularly engage in training (3+ opportunities annually) experience higher salary growth.
- Training and Satisfaction:
  - More training correlates with higher job and environment satisfaction, especially for employees taking at least 1 or 2 sessions annually.
- Opportunities and Satisfaction Levels:
  - Employees who take more training opportunities report higher satisfaction, while fewer opportunities lead to a wider range of satisfaction levels, including dissatisfaction.

Satisfaction and Performance Analysis:

Executed by: Esraa Ashraf Othman Eldesouky

- Job Satisfaction and Work Environment:
  - The highest turnover rate (30%) was among employees dissatisfied with the work environment, suggesting that dissatisfaction with the work environment may contribute to employee turnover.
- Relationship Satisfaction:
  - The highest turnover rate (29%) was observed among employees very dissatisfied with their relationships with colleagues. Interestingly, the turnover rate was lower (24%) among those who were just dissatisfied, indicating that relationship satisfaction may not strongly influence turnover.
- Work-Life Balance and Retention:
  - Employees who were very dissatisfied with their work-life balance had the highest turnover rate (30%), highlighting the need to improve work-life balance to reduce turnover.
- Self-Rating and Salary:
  - Self-ratings did not show a significant correlation with salary levels. Even employees who rated themselves as exceptional had lower-than-expected salaries.
- Manager Rating and Salary/Turnover:
  - Manager ratings did not significantly impact salary levels or turnover. Employees rated as "above and beyond" often had lower salaries and higher turnover rates.
- Work-Life Balance and Tenure:
  - Employees who were very dissatisfied with their work-life balance had the shortest tenure, reinforcing the need for work-life balance improvements.
- Performance and Salary:
  - Employees who self-rated as "meeting expectations," were satisfied with their jobs, and received "exceeding expectations" from their managers still had the lowest average salaries, suggesting no strong link between performance ratings and salary.
- Promotion and Performance:
  - Less than a quarter of employees who had not been promoted in over 5 years were rated as needing improvement, suggesting performance ratings may not directly influence promotions or transfers.
- Performance Reviews and Promotion:
  - Employees who had not been promoted for over 5 years were typically assessed more than once, while more than half of promoted employees were assessed only once or not at all, suggesting that frequent assessments do not necessarily lead to promotions.
- Job Satisfaction and Turnover:
  - Despite varying job satisfaction levels, turnover rates increased in 2021 and 2022, with the highest rates observed among employees with high satisfaction or neutrality. This implies that job satisfaction may not be the main factor driving turnover.

Predictive Analysis:

Executed by: Hend Mohammed Abd El-Ghafour

- **Salary Forecast (2023-2027):**
  - Overall Salary Forecast:
    - The initial sum of total salaries for 2023 is estimated at $15.83M, with a potential change of ± $5.61M.
    - A high seasonal effect was projected for 2027 with an increase of $0.34M, while the lowest seasonal dip is expected in 2026, decreasing by $0.85M.
    - The trend accounts for 44.2% of the forecast variability, and seasonality contributes 55.8%, leading to a forecast quality marked as poor.
  - Technology Department Salary Forecast:
    - The initial salary for 2023 is estimated at $9.81M, with a possible change of ± $3.51M.
    - The seasonal effect is projected to lower the salary by $0.83M in 2026, with the highest increase of $0.14M expected in 2027.
    - The trend explains 49.4% of the variance, and seasonality contributes 50.6%, also resulting in a poor forecast quality.
  - Sales Department Salary Forecast:
    - The starting salary for 2023 is projected to be $4.97M, with a possible change of ± $2.66M.
    - The lowest seasonal effect is expected in 2026, reducing the salary by $0.61M, with a minor increase of $0.03M predicted for 2027.
    - The contribution from trend is 19.8%, while seasonality contributes significantly with 80.2%, leading to a poor forecast quality.
  - Human Resources Department Salary Forecast:
    - The initial salary forecast for 2023 is $0.29M, with an anticipated variation of ± $0.84M.
    - The highest seasonal impact is expected in 2026, increasing salaries by $0.09M, while 2027 might see a decline of $0.14M.
    - Trend accounts for 25.5% of the variance, while seasonality contributes 74.5%, resulting in poor forecast quality.
- **Hired Employees (2023-2027):**
  - Overall Hired Employees:
    - The initial number of hired employees for 2023 is forecasted to be 122, with a possible variation of ±30 employees.
    - A slight decline of 6 employees is expected due to seasonal factors, with the lowest seasonal impact predicted in 2027 (-6 employees) and the highest in 2026 (+5 employees).
    - The seasonal effect accounts for 86.6% of the variability, while the trend explains only 13.4%, resulting in a *poor* forecast quality.
  - Technology Department Hired Employees Forecast:
    - The Technology department is forecasted to hire 82 employees in 2023, with a variation of ±18 employees.
    - The seasonal effect could reduce hires by 4 employees, with the lowest seasonal dip predicted in 2027 (-3 employees) and the highest increase in 2026 (+2 employees).
    - The contribution from the trend is 26.9%, with seasonality explaining 73.1%, leading to an *OK* forecast quality.

- Sales Department Hired Employees Forecast:
  - The Sales department is expected to hire 43 employees in 2023, with a possible variation of ±14 employees.
  - Seasonal changes could lower the count by 1 employee in 2026 and 2 employees in 2027, while the highest seasonal increase is forecasted for 2026 (+3 employees).
  - The forecast is almost entirely driven by seasonality, with a contribution of 99.5%, leading to an *OK* forecast quality.

- Human Resources Department Hired Employees Forecast:
  - The Human Resources department is projected to hire 4 employees in 2023, with a potential variation of ±6 employees.
  - The seasonal effect could reduce hires by 1 employee in 2026, with a small increase of 1 employee in 2027.
  - The contribution from the trend is only 6.6%, while seasonality explains 93.4%, resulting in a *poor* forecast quality.

○ Resigned Employees (2023-2027):

- Overall Resigned Employees:
  - The initial number of resigned employees in 2023 is forecasted to be 62, with a possible variation of ±18.
  - The highest seasonal impact is expected in 2027 with an increase of 4 resignations, while the lowest impact is forecasted for 2026 with an increase of 2 resignations.
  - The forecast is driven almost entirely by the trend (99%), with only 1% attributed to seasonal effects, leading to a *poor*-quality forecast.

- Resigned Employees in the Technology Department:
  - In 2023, 43 employees are expected to resign from the Technology department, with a potential variation of ±8.
  - The seasonal effect shows a potential increase of 23 resignations, with 6 more resignations in 2027 and 1 more in 2026.
  - The forecast relies heavily on the trend (91.2%), resulting in a *poor* forecast quality, indicating uncertainty in predicting resignations accurately.

- Resigned Employees in the Sales Department:
  - The initial forecast for 2023 shows 22 resigned employees in Sales, with a variation of ±12 employees.
  - Seasonal factors are less significant here, with an increase of 9 resignations in 2026 and a potential increase of only 1 in 2027.
  - The forecast is primarily trend-based (98.4%), with minor seasonal influence, providing an *OK* quality forecast.

- Resigned Employees in the Human Resources Department:
  - The Human Resources department is forecasted to have 3 resignations in 2023, with a possible variation of ±3.
  - The seasonal effect shows a minor increase of 1 resignation in 2026, with a slight dip in 2027.
  - The forecast is mainly driven by the trend (89.9%) with a reasonable seasonal effect (10.1%), leading to an *OK* forecast quality.

○ Opportunities Offered & Taken (2023-2027):

- Overall Training Opportunities:
  - The forecast indicates a steady trend in the number of training opportunities offered and taken between 2023 and 2027.
  - The number of training opportunities taken in 2023 is forecasted at 1,220, with a 98.2% trend contribution, showing a strong reliance on historical trends.
  - Training opportunities offered are projected at 2,516 in 2023, with a "Good" quality forecast and a stronger influence from trend (100%) compared to seasonal effects.

- Technology Department:
  - In 2023, employees are expected to take 804 training opportunities, with a relatively low seasonal effect (3.2%) and a 96.8% trend contribution.
  - Training opportunities offered in the Technology department are forecasted at 1,687 in 2023, also with a strong trend impact (100%).
- Sales Department:
  - Sales employees are expected to take 366 training opportunities in 2023, with minimal seasonal influence (0.2%) and a forecast quality labeled "Ok."
  - Training opportunities offered in Sales are projected at 730 in 2023, with a slight seasonal influence (0.4%) and a forecast quality of "Good."
- Human Resources Department:
  - Human Resources is expected to have only 47 training opportunities taken in 2023, showing the lowest seasonal effect (5.2%) among the departments, with 94.8% contribution from the trend.
  - Training opportunities offered in Human Resources are the lowest at 108, with the trend dominating forecasts and a moderate seasonal pattern.

Conclusion:

Gender analysis:

- There is little bias of hiring females (46%).
- Males represent the highest turnover ratio (48%) of total turned over employees because there is bias in salary, males who have doctorate (23 male) and master degree (190 male) get low average salary (136,050 for doctorate – 112,595 for master) comparing with other genders as following:
  - Non binary ⟶ get highest average salary 182,481 for doctorate.
  - Female ⟶ get highest average salary 125,551 for master.
- There is no bias in manager rating (the highest rating is meets expectation for all genders).
- There is no bias in equity grant as following:
  - 58% of total females own (537) share.
  - 58% of total males own (528) share.
  - 51% of total non-binary own (91) share.
  - 45% of total prefer not to say own (11) share.
- The company grant shares to employees regardless of education level following:
  - (42) female have (no formal qualification) and own shares.
  - (34) male have (no formal qualification) and own shares.
  - (8) non binary have (no formal qualification) and own shares.
  - (2) prefer not to say have (no formal qualification) and own shares
- The company grant shares to employees regardless of education level following:
  - (53) female had no manager rating (null) and own shares.
  - (49) male had no manager rating (null) and own shares.
  - (10) non binary had no manager rating (null) and own shares.
  - (3) prefer not to say had no manager rating (null) and own shares.

Race Analysis:

- It is obvious that there is diversity in the company as when calculations have done on the current employees, their count appeared as follows:
  - Count of white is 860
  - Count of other races 16
  - Count of native Hawaiian 26
  - Count of mixed or multiple groups 198
  - Count of black of African American 10
  - Count of Asian American 113
  - Count of American Indian 5

- the count of white employees is high and that is reflected in the total hired each year. As well as, in 2020 and 2021 the only hired were white.

- This far high white employees count has appeared in in many aspects as their count was high in each department.
  - **The Technology Department:** the white employees are 567 followed by the black and African American with count of 142.
  - **The Sales Department:** the white employees are 263 followed by mixed ethnic groups 66.
  - **The Human Resources Department:** white employees are 30 and ethnic groups 12

- Regarding the salary, the white employees have gotten the highest salary and the lowest salary because of the huge gap among the rates for the other races:
  - The white employees are 'extra_high' = 30,672
  - The white employees are 'very_high' = 18,963
  - The white employees are 'low' = 22,109
  - The white employees are 'Medium' = 16,139

- For the managerial rating, the white employees are the highest in each rating, either good or bad, exceeding any other race. The reason for that is the exceeding count of the white employees above the other races.

Demographics & Personal Information analysis:

- The highest average salary (245,126) for "Adult" (age range 35-44)" and highest average salary (154,269) for employees have "Doctorate", that means salary depends on education level more than depending on age.
- The highest average salary (154,197) for "White" that means there is bias for white employees in salary and regardless of their high salary they represent the highest count of employees turned over (137)
- The highest count of employees turned over are single (128).
- The highest employees turned over have "Bachelors" (99).
- The distance level has no impact on turnover because employees turned over (64) their distance level "Short" that means the salary may depends on distance level and transportation cost also.

Work Profile:

- Salary distribution appears to be largely influenced by position and age, with managers receiving higher salaries.
- Further investigation is required to explore the impact of overtime on salary levels.
- The relationship between salary and equity shares varies across departments and lacks consistency, indicating other factors may influence salary distribution, such as department size and the distribution of salary levels among employees.
- Salary distribution according to Business travel Classification:
  - The highest average salary is in the no travel group, likely due to differences in age and position.
  - The highest salary overall is in the frequent travel group, suggesting the possibility of travel bonuses. Except in the medium level, where, the highest max salary is in the "some travel" group, but frequent travel follows closely, suggesting possible travel bonuses. Distribution needs further investigation by age and job role.
- Travel responsibilities may have an impact on turnover rates, as the majority of resigned employees were involved in either frequent or occasional travel.
- The lack of equity grants could be a significant factor contributing to employee resignations. Offering equity may help reduce turnover, as employees receiving higher-level shares are less likely to leave.
- The majority of employees are resigning early in their tenure, particularly within the first 1-2 years. This trend raises concerns about company policies related to retention, promotion, and management practices. Addressing issues that arise during the early stages of employment could be crucial to improving employee retention.
- While salary appears to be a strong factor in reducing turnover, the impact of promotion gaps on turnover needs further investigation to draw a reasonable conclusion. Addressing promotion delays and offering competitive salaries could improve retention, particularly in departments with higher turnover rates.
- The rise in resignations, particularly among employees with shorter tenures, suggests a need to investigate salary structures and career development opportunities as potential retention strategies.
- The lack of a direct connection between hiring and turnover processes points to more complex hiring motivations beyond replacing outgoing employees.

Opportunities & Growth Analysis:

- Training opportunities are unevenly distributed across departments, roles, and demographics, with white employees taking the most.
- More training leads to higher retention, salary growth, and job satisfaction, while underrepresented groups and departments, like technology, show lower participation.
- White employees dominate key metrics like training opportunities, salary, and managerial ratings, highlighting areas for improvement in diversity and inclusion.
- Employees, especially in tech, often miss training opportunities, which may require further investigation.
- Manager tenure and training opportunities play a critical role in employee retention and satisfaction.

Performance & Ratings Analysis:

- Work environment dissatisfaction and poor work-life balance are key factors linked to employee turnover, suggesting these areas require improvement.
- Relationship satisfaction and performance ratings (both self and manager) seem to have minimal impact on salary and turnover.
- Frequent performance assessments may not be a strong predictor of promotion, as many promoted employees were only assessed once.
- Job satisfaction alone does not appear to drive turnover, as even highly satisfied employees experienced increased turnover rates in recent years

Predictive Analysis:

- **Salary Forecast (2023-2027):**
  - Overall:
    - Across all departments, forecast quality is rated as poor, with significant variability attributed to seasonal fluctuations. Salaries are expected to show irregular patterns due to the strong seasonal influence, and deeper investigation is needed to improve forecast accuracy.
  - Technology and Sales Departments:
    - Both departments have notable salary variances, with the Tech department exhibiting a larger salary base but high volatility. The Sales department shows a strong seasonal impact, making salaries highly dependent on seasonal trends.
  - HR Department:
    - Though the salary base is significantly lower than Tech and Sales, the forecast in HR shows considerable uncertainty due to the large range in the predicted salary changes, influenced heavily by seasonality.

- **Hired Employees (2023-2027):**
  - Overall:
    - The forecast for hired employees shows significant uncertainty, heavily driven by seasonal fluctuations across all departments. The overall quality of the forecast is *poor*, suggesting that additional factors beyond seasonality should be investigated to improve hiring predictions.
  - Tech and Sales Departments:
    - These departments show *okay* forecast quality, though seasonal effects dominate. Tech, being the larger department, may face more variability in hiring numbers, while Sales shows a near-total dependence on seasonal hiring trends.
  - HR Department:
    - Forecasting for HR shows considerable uncertainty, with a small initial hiring count and a wide potential range. The strong seasonal influence suggests that hiring in this department is unpredictable, with *poor* forecast quality. Further analysis is required to enhance accuracy in hiring predictions for this department.
- **Resigned Employees (2023-2027):**
  - Overall:
    - The forecast for resigned employees suggests a strong trend-driven prediction, but with *poor* forecast quality for overall resignations and specifically for the Tech department. This indicates a high level of uncertainty and a need for deeper analysis to improve accuracy.
  - Tech Department:
    - The Tech department forecast shows significant variability in resignations, with a strong trend component, but poor forecast quality indicates challenges in accurately predicting turnover.
  - Sales and HR Departments:
    - These departments show *okay* forecast quality, with more stable patterns in resignations. However, Sales has a wider range of possible outcomes, while HR exhibits less variability but remains trend-dependent.
- **Opportunities Offered & Taken (2023 – 2027):**
  - Trend Dominance:
    - The forecasted trends suggest that training opportunities offered and taken are primarily driven by past patterns rather than seasonal fluctuations. This highlights consistent training practices within the company over the years.
  - Tech & Sales Lead Training Participation:
    - The Tech department continues to offer and take significantly more training opportunities than Sales and HR, indicating a stronger focus on employee development in technical roles.
  - HR Training Participation is Minimal:
    - HR shows the lowest levels of training opportunities both offered and taken, which may suggest limited opportunities for professional development within this department.

Future Researches:

- Does longer tenure or role tenure lead to higher salaries?
- What caused the maximum hiring in 2012 & 2022, and how does it relate to turnover?
- What is the technique used in distributing equity grant in each job role across departments?
- Further investigation is needed across departments to explore how travel duties influence employee turnover more comprehensively.

○ Forecasting:

- Improving the Salaries model by investigating the seasonal patterns and trends further could help in making more accurate projections.
- To improve the forecast, deeper analysis into non-seasonal factors affecting hiring trends (such as industry changes, company policies, or market demand) could provide a more accurate projection.
- The heavy reliance on trends and minimal seasonal impact across departments suggests that other factors (e.g., company policies, market conditions) could be driving resignation trends, warranting further investigation.
- Given the heavy reliance on trend-based forecasting, further research may be warranted to explore other factors (e.g., budget, employee preferences) affecting training opportunities across departments.

Final Report & Presentation:

- Prepared a Detailed report covering the whole process done
- Created a presentation demonstrating the key steps taken in this project.
- **Project Files:**
  - HR Folder (Data Source – Consists of a set of Excel files)
  - HR-Final Project-DEPI - G2 - Group 3.ipynb
  - HR - Final Project - G2 - Group 3.sql
  - Human_Resources.xlsx
  - HR - Final Project - G2 - Group 3.twbx
  - HR- Final Project -G2 - Group 3- Report.pdf
  - HR- Final Project-G2 - Group 3.pptx

Note:

There is no external data source supporting the dataset description. All descriptions are based on thorough research and with the aid of ChatGPT.

Team Contributions:

This project was carried out through the collective efforts of the entire team, with responsibilities distributed among all members. The following section provides a summary of the tasks completed by each team member, outlining the overall distribution of work across the project.

Hend Mohammed Abd El-Ghafour:

- Dataset Description
- Data Preprocessing (Python – SQL)
- Initial Investigation (Python - SQL)
- Work Profile Analysis (Dashboard – Insights – Conclusion)
- Predictive Analysis (Dashboard – Insights – Conclusion)

Marina Nabil Farag Morkoss

- Gender Analysis (Dashboard – Insights – Conclusion)
- Demographics & Personal Information Analysis (Visualization – Insights – Conclusion)

Esraa Ashraf Othman Eldesouky

- Performance & Ratings Analysis (Dashboard – Insights – Conclusion)

Sarah Ayman Mohamed Eldeeb

- Opportunities & Growth Analysis (Dashboard – Insights – Conclusion)

Iman Abdelfattah Mohmed Elamroussi

- Race Analysis (Dashboard – Insights – Conclusion)