Date: 31 July 2025

SkillWallet ID: SWUID20240141492

Project Title: Employee Performance Prediction using Machine Learning

Maximum Marks: 6 Marks

Data Exploration and Preprocessing Report

Dataset variables were statistically analyzed to identify patterns, correlations, and outliers. Python was employed for preprocessing tasks such as normalization, encoding, and feature engineering. Data cleaning ensured the removal of inconsistencies, missing values, and outliers, providing a strong foundation for model development.

Section Description

Data Overview:

• **Dimension:** 1,197 rows × 15 columns

• Descriptive Statistics:

• Mean targeted productivity: **0.76**

• Average overtime: **1.45 hours**

• Average incentive: **110.35** (monetary units)

• Average idle time: **14.2 minutes**

Univariate Analysis:

- Plotted histograms for continuous features: targeted_productivity, smv, over_time, incentive.
- Observed skewness in **over_time** and **idle_time** distributions.

Bivariate Analysis:

- Scatter plots between **targeted_productivity** and **performance_score** indicated a strong positive correlation.
- Boxplots revealed that excessive **over_time** reduces actual performance efficiency.

Multivariate Analysis:

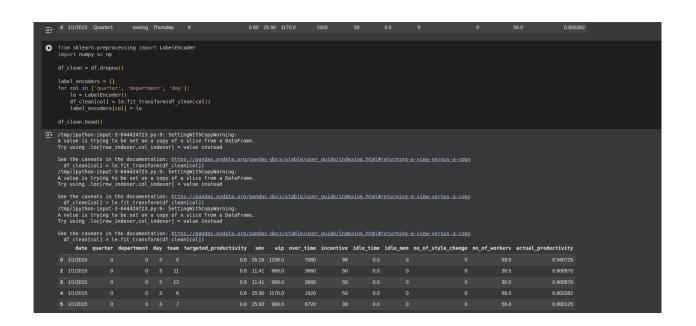
- Correlation heatmap showed high correlation between **idle_time** and **idle_men**.
- Productivity is influenced by a combination of **department**, **quarter**, and **incentive**.

Images

1.Loading Data

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⊙	df = p df.hea	od.rea		arments_work			.csv")	Smv	win	over time	incentive	idle time	idle men no	of style change	no of workers	actual productivity			
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2. Handling Missing Data:



Data Transformation:

```
[] scaler.fit(X,train)

→ **StandardScaler()

[] X,train.standardized = scaler.transform(X,train)

→ print(X,train.standardized)

→ [[] 1.4(989888 1.79289426 1.37960865 ... 1.044121 0.52295995 (0.4499878)] [1.1605595 -0.1440138 1.07122175 ... 0.5904779 0.44153782 (-0.85281316) (0.6999278) -0.77271123 0.09822185 ... 0.64047556 -0.31161687 (-0.9528086) (1.0499888 0.89267390 ... 0.01894621 3.06583565 (-1.10982269) (1.0499888 0.89267390 ... 0.01894621 3.06583565 (-1.109822695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392695) (0.2392
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