Assignment 1

Business Analytics Fundamentals

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Module: **SC6120**
Student ID: **24259748**

Assignment Details

Objective:

The management of a hotel chain seeks to enhance employee retention, job satisfaction, and overall workplace morale across all departments. To achieve this, an analysis of the hotel staff's demographic information, job satisfaction, work environment scores, and compensation is being conducted. The insights will inform strategies to improve employee engagement and optimize resource allocation for professional development and workplace enhancements.

Context:

The hotel has noticed increasing turnover rates in certain departments and declining scores in internal surveys regarding job satisfaction and work environment. These issues, if unaddressed, could lead to higher recruitment costs, training expenses, and possible negative impacts on customer service quality. As a result, management has prioritized understanding the factors that influence employee satisfaction and the effectiveness of the work environment across departments.

Purpose:

This analysis will focus on the following key questions/areas of interest:

1. **Which departments report the lowest job satisfaction and work environment scores?**
   - Identifying the departments with the lowest scores will help target improvement efforts.
2. **Are there correlations between age, nationality, years at the hotel, and job satisfaction or work environment?**
   - Understanding if demographic factors influence satisfaction can guide personalized employee engagement strategies.
3. **Does employee salary correlate with job satisfaction or work environment perceptions?**
   - If salary significantly impacts satisfaction, this could justify budget adjustments for raises or performance bonuses.
4. **What recommendations can be derived to improve job satisfaction, employee retention, and workplace morale?**
   - By understanding what drives satisfaction and dissatisfaction, the hotel can implement targeted programs such as professional development, team-building exercises, or departmental restructuring.

Software Used

- Knime Analytics Platform
- Microsoft Excel
- Microsoft Word

Dataset Breakdown

Column headers Description:

The dataset includes the following variables:

- ***Employee ID:*** Unique identifier for each employee.
- ***Age:*** Employee's age.
- ***Nationality:*** Employee's nationality.
- ***Job Satisfaction Score:*** Rating on job satisfaction (1 to 5 scale…Scores closer to 5 are more satisfied with their job).
- ***Work Environment Score:*** Rating of work environment (1 to 5 scale…Scores closer to 5 are more positive about their work environment).
- ***Years at Hotel:*** Number of years the employee has worked at the hotel.
- ***Department:*** Department where the employee works.
- ***Monthly Salary:*** Monthly salary in Euros.

Table Dimension:

Knime node used: Extract Table Dimension

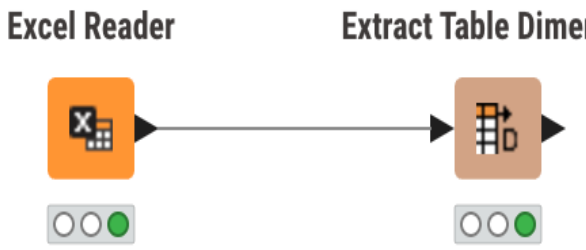

Fig. 1: Knime Node (Activated)

RowID	Dimensions *Number (integer)*
Number Rows	30
Number Columns	8

Fig. 2: Result

The given dataset of hotel staff contains **30 rows** and **8 columns** with relevant employee-related data.

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Data Pre-processing

Missing Data:

EmployeeID *Number (integer)*	Age *Number (integ...*	Nationality *String*	Job Satisfaction Score *Number (integer)*	Work Environment Score *Number (integer)*	Years aAt Hotel *Number (integer)*	Department *String*	Monthly Salary *Number (integer)*
1	50	Australian	5	-6	13	Food & Beverage	3661
2	36	American	2	3	19	Front Desk	3153
3	29	British	2	1	7	Maintenance	3076
4	42	Indian	4	3	17	Front Desk	3707
5	40	American	2	5	4	Food & Beverage	4777
6	44	Indian	2	2	5	Housekeeping	36950
7	32	German	4	2	7	Management	3733
8	32	British	4	1	13	Food & Beverage	3439
9	45	British	1	4	15	Front Desk	4294
10	57	Amriecan	5	1	11	Management	2835
11	45	British	5	4	4	Front Desk	2202
12	24	Australian	2	2	13	Front Desk	2122
13	143	British	5	1	7	Housekeeping	2400
14	23	Indian	2	5	19	Management	2766
15	45	Indian	1	3	2	?	2293
16	51	Indian	4	4	10	Housekeeping	4327
17	59	Indian	4	3	13	Food & Beverage	4931
18	23	Australian	4	3	6	Front Desk	2197
19	42	Canadian	5	1	12	Maintenance	3930
20	54	German	1	3	12	Front Desk	4799
21	33	American	5	?	11	Front Desk	4191
22	43	Indian	5	33	7	Food & Beverage	2608
23	46	British	1	1	1	Front Desk	3147
24	48	Indian	1	5	1	Housekeeping	2186
25	49	British	1	2	13	Housekeeping	4511
26	37	German	1	3	9	Management	3794
27	36	German	4	1	3	Maintenance	2659
28	24	German	?	2	7	Front Desk	4811
29	58	British	3	2	6	Front Desk	3955
30	28	Indian	1	4	8	Food & Beverage	44500

Fig. 3: Hotel Staff dataset before Data Pre-processing

We can clearly see that the data is missing "?" in the following columns:

- Job Satisfaction Score
- Work Environment Score
- Department

As this data cannot be assumed, We will remove the 3 rows with missing values.

Knime node used: Missing Value

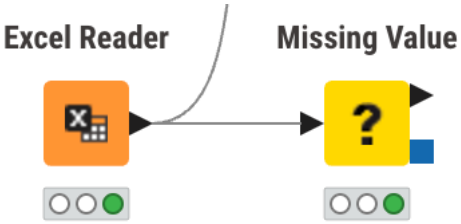

Fig. 4: Missing Value Node

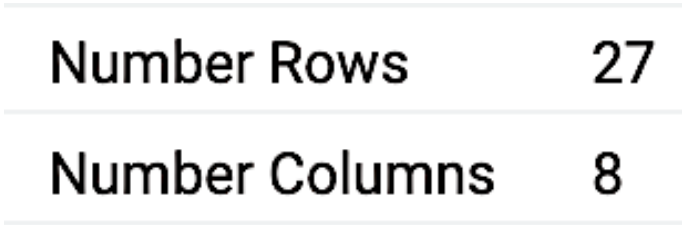

Fig. 5: Result

After deleting the rows with missing value we have **27 rows** and **8 columns.**

Detecting Outliers:

The 2nd step of data pre-processing is detecting and then removing outliers from the table.

Knime node used: Numeric Outliers

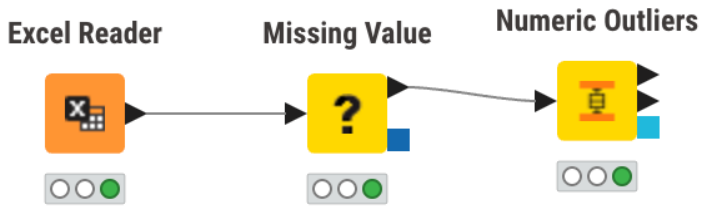

Fig. 6: Outlier Node

*We discovered that the table had a total of **5 outliers** in the columns mentioned below.*

Outlier column *String*	Outlier count *Number (integer)*
Age	1
Job Satisfaction Score	0
Work Environment Score	2
Years aAt Hotel	0
Monthly Salary	2

Fig. 7: Outliers in the table

Number Rows	22
Number Columns	8

Fig. 8: Result after removing the rows with outliers

After deleting the rows with missing value we have **22 rows** and **8 columns.**

We now have a clean table with none of the rows have missing values or outliers.

A metanode by the name of Data Pre-processing has been created to store all the nodes used in the Data Pre-processing process (i.e. Missing Value, Numeric Outliers).

Table Analysis

Analysis 1: Which departments report the lowest job satisfaction and work environment scores?

Knime Nodes Used: GroupBy node, Bar Chart node.
Process: The clean data is processed through a GroupBy node which shows the average job satisfaction and work environment scores in each department. We have visualised all the information in the form of a Bar Chart (Fig. 8).

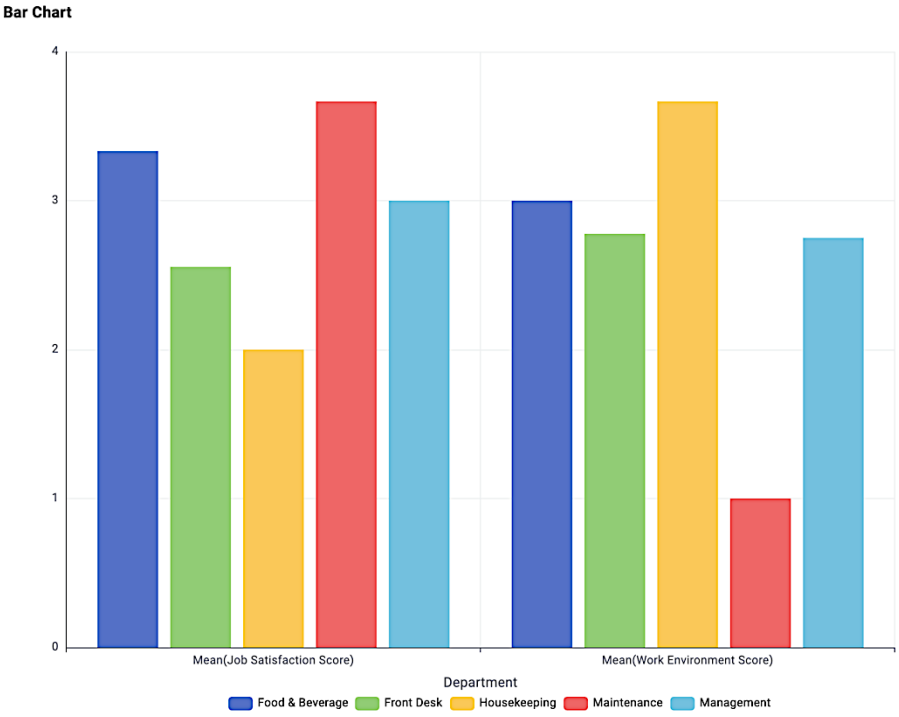

Fig. 8: Bar Chart

Result: In Fig. 8, We can clearly see that the **Housekeeping** department has the lowest average job satisfaction score and the Maintenance department has the lowest average work environment score.
KNIME flow:

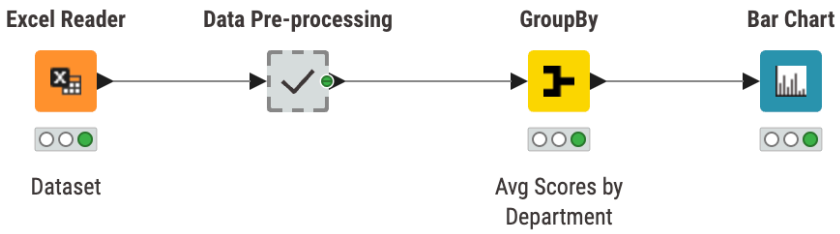

Fig. 9: KNIME flow for Analysis 1

Both the nodes are then placed in a metanode by the name Analysis 1.

Analysis 2: Are there correlations between age, nationality, years at the hotel, and job satisfaction or work environment?

Knime Nodes Used: Normalizer node, Linear Correlation node & Scatter Plot Matrix node.

Process: Four columns (i.e. Age, Job Satisfaction Score, Work Environment Score and Years aAt Hotel) are processed through a Normalizer node which performs a-z normalization on the data. Linear Correlation is performed on the data (Fig. 10). We have visualised all the information in the form of a Scatter Plot Matrix (Fig. 11).

RowID	Age *Number (double)*	Job Satisfaction Score *Number (double)*	Work Environment Score *Number (double)*	Years aAt Hotel *Number (double)*
Age	1	0.051	0.015	-0.122
Job Satisfaction Score	0.051	1	-0.28	-0.011
Work Environment Score	0.015	-0.28	1	0.078
Years aAt Hotel	-0.122	-0.011	0.078	1

Fig. 10: Correlation Matrix

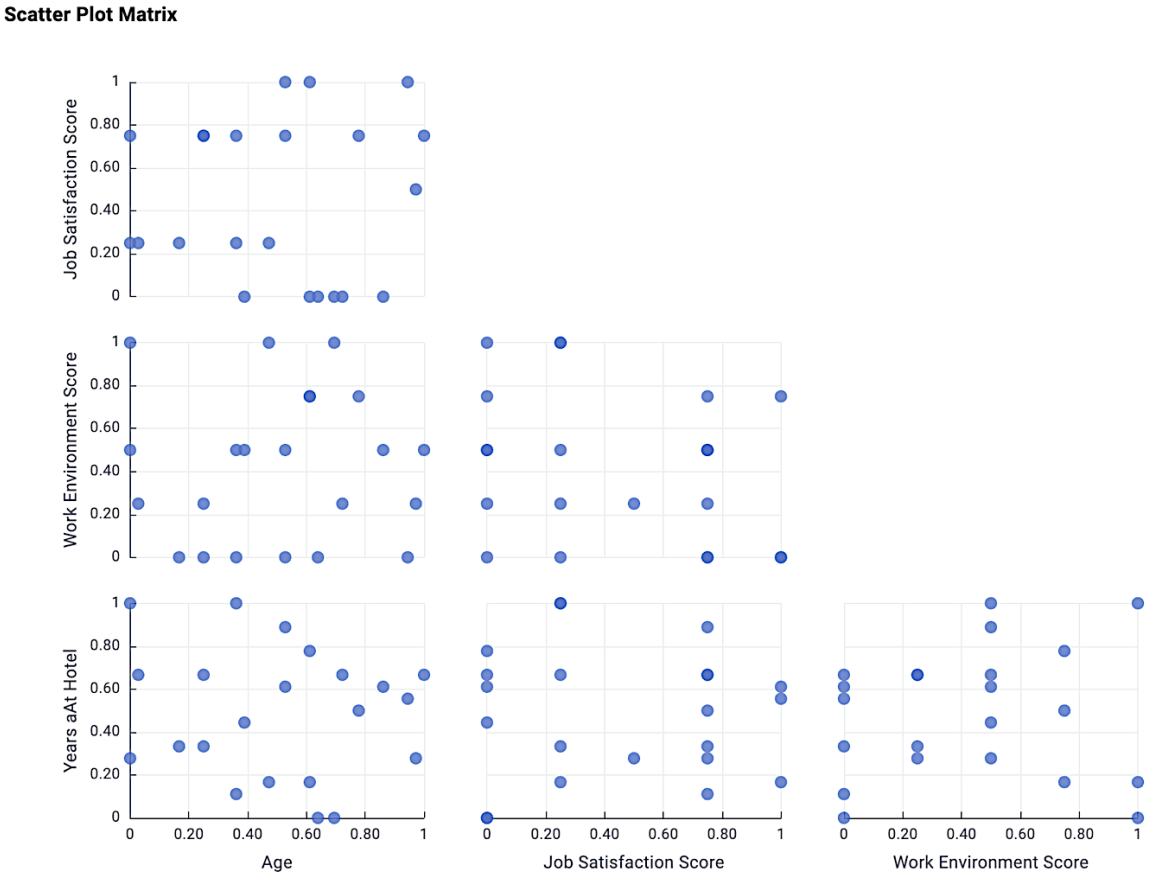

Fig. 11: Scatter Plot Matrix

Result:

In Fig. 10, we can see that,

- There is a **very weak positive correlation** between Age and Job Satisfaction score which is **0.051,** suggesting that there is almost no connection between the two.
- There is **almost no correlation** between Age and Work Environment score which is **0.015,** suggesting there is almost no connection between the two.
- There is a **very weak negative correlation** between Age and Years at a Hotel which is **-0.122,** suggesting that there is almost no connection between the two.
- There is a **weak negative correlation** between Work Environment score and Years at a Hotel which is **-0.28,** suggesting that as one increases the other tends to decrease.
- There is **almost no correlation** between Job Satisfaction score and Years at a Hotel which is **-0.011**, suggesting there is almost no connection between the two.
- There is a **very weak positive correlation** between Years at a Hotel and Work Environment score which is **0.078**, suggesting that there is almost no connection between the two.

KNIME flow:

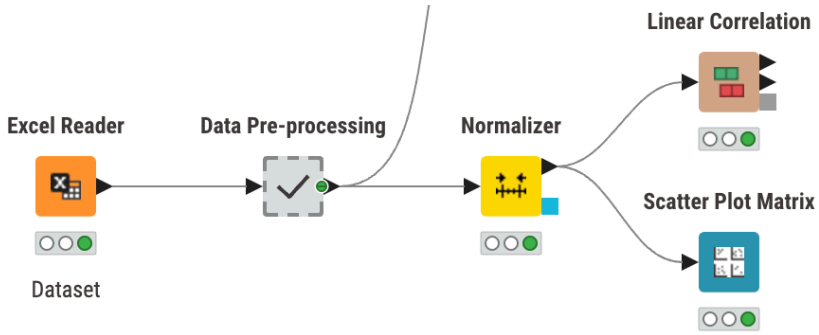

Fig. 12: KNIME flow for Analysis 2

All the three nodes are then placed in a metanode by the name Analysis 2.

Analysis 3: Does employee salary correlate with job satisfaction or work environment perceptions?

Knime Nodes Used: Normalizer node, Linear Correlation node & Scatter Plot Matrix node.

Process: Three columns (i.e. Monthly Salary, Job Satisfaction Score and Work Environment Score) are processed through a Normalizer node which performs a-z normalization on the data. Linear Correlation is performed on the data (Fig. 13). We have visualised all the information in the form of a Scatter Plot Matrix (Fig. 14).

RowID	Job Satisfaction Score *Number (double)*	Work Environment Score *Number (double)*	Monthly Salary *Number (double)*
Job Satisfaction Score	1	-0.28	-0.157
Work Environment Score	-0.28	1	0.08
Monthly Salary	-0.157	0.08	1

Fig. 13: Correlation Matrix

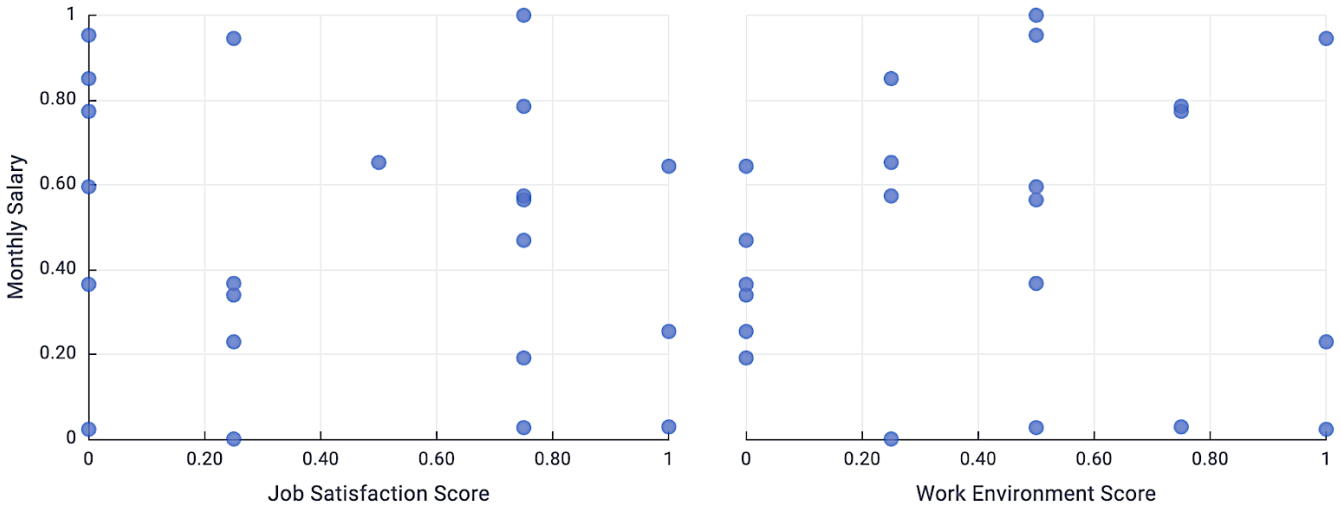

Fig. 14: Scatter Plot Matrix

Result:

In Fig. 13, we can see that,

- The correlation coefficient between the Monthly Salary and Work Environment Score is **0.08**. There is a **very weak positive correlation** between the two. This means that employees with higher salary gave better Work Environment Score.
- The correlation coefficient between the Monthly Salary and Job Satisfaction Score is **-0.157**. There is a **very weak negative correlation** between the two. This means that employees with higher salary gave less Work Environment Score.

Based on the analysis, we can say that there is no strong correlation between these.

KNIME flow:

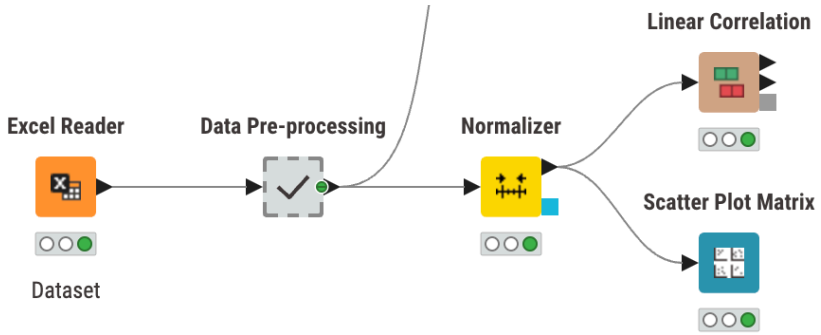

Fig. 15: KNIME flow for Analysis 3

All the three nodes are then placed in a metanode by the name Analysis 3.

Analysis 4: What recommendations can be derived to improve job satisfaction, employee retention, and workplace morale?

Based on the analysis that I have performed on the given dataset, I can make the following recommendations to improve job satisfaction, employee retention, and workplace morale:

Job Satisfaction:

- Consider organising training and development programs for employees to upskill them and improve job satisfaction.
- Provide career advancement opportunities to employees within their departments.
- Implement preventive maintenance strategies to reduce employee workload.
- Encourage open communication and feedback.

Employee Retention:

- Create a brand image of the hotel that attracts and retains top talent.
- Implement a comprehensive and engaging onboarding process which helps new employees feel welcomed and valued.
- Actively listen to employee feedback and concerns.
- Take action on employee's feedback to show that their input is valued.

Workplace morale:

- Promote a positive and inclusive culture.
- Offer opportunities for social interaction and team-building activities.

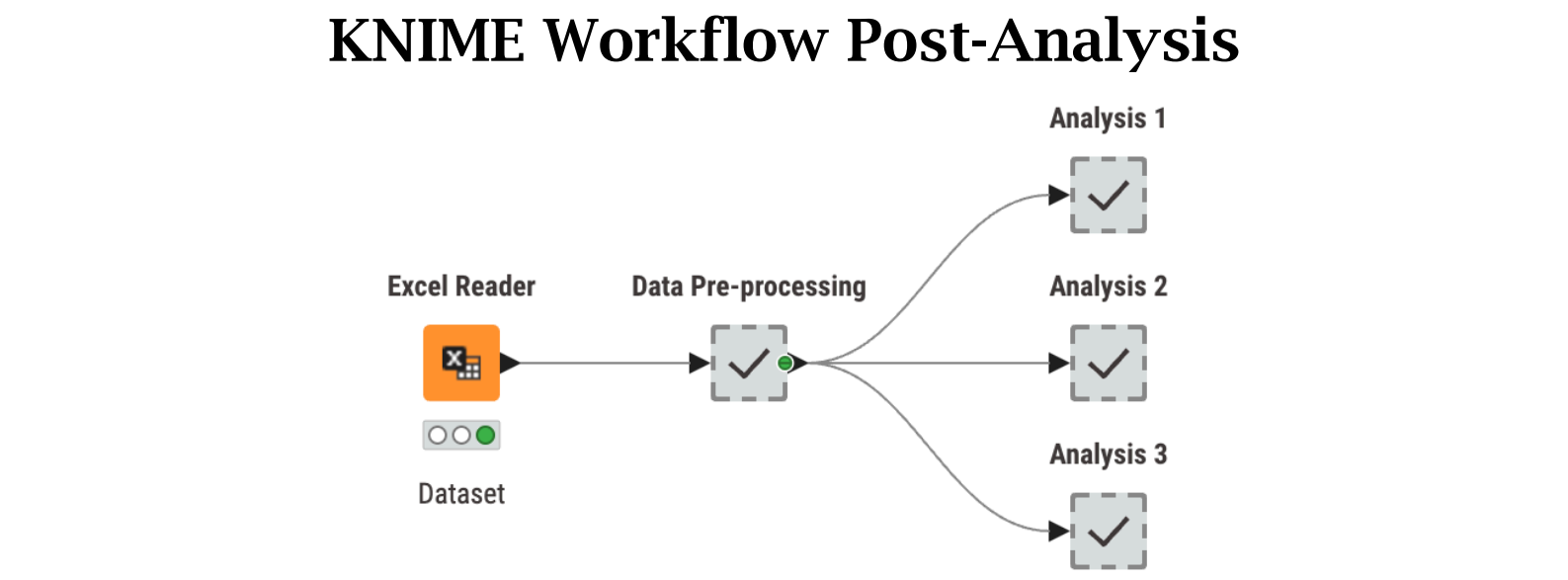

Fig. 16: KNIME Workflow Post-Analysis