Colder Days, Cheaper Tickets?

Methods of Advanced Data Engineering

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Table of Contents

Introduction

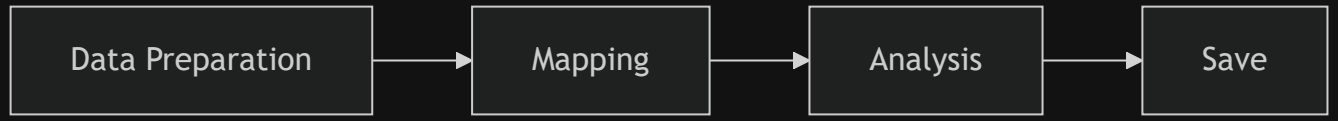
- **Objective:** Investigate if air travel tickets are cheaper during colder months in North America.
- **Why:** Common advice suggests traveling in winter for cheaper tickets, but is this true?

Data Used

- **Flight Data:**
  - Source: 2018 Airplane Flights from Kaggle
  - Key Columns: `PricePerTicket`, `Miles`, `Quarter`
  - License: CC0: Public Domain
- **Weather Data:**
  - Source: Average day weather for 2018 from Kaggle
  - Key Columns: `DailyAverageDewPointTemperature`, `DATE`
  - License: CC0: Public Domain

Methodology

1. **Data Preparation:**
   - Download the datasets from Kaggle and clean it.
2. **Mapping:**
   - Mapped weather data to flight quarters.
3. **Analysis:**
   - Calculated average temperature and price per mile for each quarter.
4. **Save**
   - Save the output of pipeline



Pipeline Details

1. **Data Downloading:**
   - The Kaggle package download the datasets from the Kaggle.
2. **Data Cleaning:**
   - The datasets are clear which I did not implement this part.
3. **Feature Mapping:**
   - Converted 'DATE' from weather data to match 'Quarter' in flight data for integration.
4. **Aggregation:**
   - Computed average temperature and price per mile by quarter to match data.
5. **Output Generation:**
   - Produced a new dataset with 'AvgTemperature', 'PricePerMiles', and 'Quarter' as features.
6. **Save**:
   - CSV file selected to store the output of pipeline because it produces a few rows as output.

Analysis Method

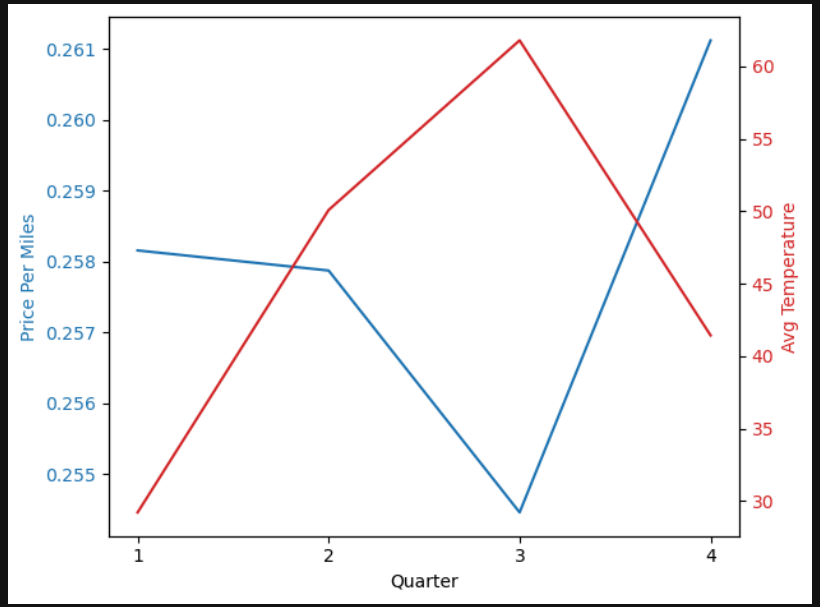
- **Correlation Analysis:**
  - **Method:** Pearson Correlation Coefficient (PCC).
- **Pearson Correlation Coefficient (PCC):**
  - **What is PCC?**
    - A measure of the linear correlation between two sets of data.
  - **Range:**
    - Values range from -1 to 1 and It is normalize.
  - **Analysis:**
    - **1:** Perfect positive correlation
    - **-1:** Perfect negative correlation
    - **0:** No correlation

Pearson Correlation Coefficient Formula

- **Formula:**
  - $r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2 \cdot \sum_{i=1}^{n}(Y_i - \bar{Y})^2}}$
  - Where X and Y are the two variables, $\bar{X}$ and $\bar{Y}$ are their means, and n is the number of observations.
- **Use Case:**
  - Ideal for determining if changes in temperature directly relate to changes in ticket prices.

Correlation Analysis Results

- **Pearson Correlation Coefficient:**
  - **Result:** -0.65, indicating an inverse relationship between temperature and price per mile.
  - **Implication:** As temperature decreases, ticket prices per mile tend to increase.



Conclusions

- **Finding:** Reject the popular belief, colder temperatures correlate with higher ticket prices.
- **Colder Days, Cheaper Tickets?:** No.
- **Results:**
  - **PCC Value:** -0.65, suggesting a moderate to strong negative correlation.
  - **Temperature Impact:** Colder days are linked with higher flight costs.
- **Implications:**
  - **Travel Planning:** Winter might not be the best time for budget travel in North America.
  - **Market Dynamics:** Higher demand or operational costs during colder months could explain this trend.
- **Reasons:**
  - Winter holidays increase travel demand.
  - Tourism patterns shift (cold to warm, warm to cold for winter sports).
  - Additional operational costs in winter (de-icing).

Limitations

- **Data Granularity:** Data by quarter, not by month or day, which might miss short-term fluctuations.
- **Holiday Effects:** No consideration for public or school holidays which influence price.

Future Work

- **Enhance Data:** Monthly or daily flight data for more precision.
- **Include Holidays:** Incorporate holidays as variables in analysis.
- **Operational Costs:** Investigate how operational costs affect pricing.

Thank You for your attention.

Questions?