README_for_Submission

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1 Week 12: Required Assignment 12.1 Submission

Course: IIMK's Professional Certificate in Data Science and Artificial Intelligence for Managers
Student Name: Lalit Nayyar **Email ID:** lalitnayyar@gmail.com

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1.1 Assignment Contents

- `Time_Series_Retail_Assignment.ipynb`: Jupyter notebook with business explanations and Python code for each assignment point.
- `Time_Series_Retail_Assignment.pdf`: PDF export of the notebook (to be generated after running the notebook).
- `export_notebook_to_pdf.py`: Script to automatically run and export the notebook to PDF.

1.2 1. Influence of Trend, Seasonality, and Cycles on Retail Strategic Decisions

Trend: - Trends represent the long-term movement in sales data (e.g., steady increase in online purchases). - Example: An 8% annual growth in e-commerce sales leads to increased stock levels and warehouse expansion.

Seasonality: - Predictable, recurring fluctuations (e.g., Diwali, Christmas, back-to-school sales). - Example: Clothing retailers stock up on winter apparel and run holiday promotions in Q4.

Cycles: - Longer-term patterns linked to economic or industry cycles (e.g., 3-5 year tech innovation cycles). - Example: Adjusting spending and staffing in anticipation of economic slowdowns or booms.

Strategic Impact: - **Inventory Management:** Trends and seasonality inform stock replenishment, reducing overstocking/stockouts. - **Marketing Campaigns:** Promotions timed to seasonal/cyclical peaks maximize ROI. - **Operational Planning:** Staffing and logistics are aligned to demand, improving efficiency.

1.3 2. Role and Impact of Irregularities (Noise) in Retail Data

Irregularities (Noise): - Noise refers to random, unpredictable fluctuations in sales data. - If misinterpreted, noise can lead to poor decisions (e.g., overreacting to a one-time sales spike). - Example: Sudden umbrella sales spike due to a storm is not a trend.

Mitigation: - Use smoothing and decomposition to separate noise from true patterns.

1.4 3. Importance of Moving Average Model for Short-Term Forecasting

- Moving averages smooth short-term fluctuations, revealing real sales patterns.
- Helps plan inventory for seasonal peaks (e.g., holiday sales).
- Example: 14-day moving average for toy sales in December ensures shelves stay stocked.

1.5 4. Advantages of ARIMA Models for Long-Term Retail Forecasting

- ARIMA models capture trend and seasonality for robust long-term forecasts.
- Supports inventory, staffing, and resource planning.
- Example: Supermarket chain forecasts next 12 months to optimize contracts, deliveries, and hiring.

1.6 Instructions for Running the Notebook and Exporting to PDF

1.6.1 Option 1: Manual (Jupyter Notebook)

1. Open `Time_Series_Retail_Assignment.ipynb` in Jupyter Notebook or JupyterLab.
2. Run all cells (`Cell > Run All`).
3. Export as PDF (`File > Download as > PDF via LaTeX`).

1.6.2 Option 2: Automatic Script

1. Ensure you have Jupyter, nbconvert, and LaTeX installed.
2. Run the provided script from the assignment folder:

   ```
   python export_notebook_to_pdf.py
   ```

3. This will execute the notebook and generate `Time_Series_Retail_Assignment.pdf`.

Note: - If you get errors about LaTeX, install MiKTeX (Windows) or TeX Live (Linux/Mac). - If you get errors about notebook validity, open and run all cells in Jupyter first.

1.7 Submission Checklist

☒ Business answers provided in markdown and notebook
☒ Python code for each point in notebook
☒ PDF export instructions and script included

For any issues, please contact: lalitnayyar@gmail.com