You work as a data scientist for "GroceryMall," a leading retail company with a vast product catalog. To improve customer experience and operational efficiency, your team is tasked with implementing market basket analysis on the "Groceries\_dataset.csv" dataset obtained from Kaggle. You need to compare the performance of the FP-growth and Apriori algorithms and recommend the best algorithm for future use.

Programming Question:

Write a Python program that performs market basket analysis on the "Groceries\_dataset.csv" dataset using both the FP-growth and Apriori algorithms. Your program should accomplish the following tasks:

* Data Preparation:
  + Load and preprocess the "Groceries\_dataset.csv" dataset.
  + Convert the dataset into a suitable format for both algorithms (e.g., a list of transactions).
* Multithreading:
  + Create two separate threads within your program. One thread will run the FP-growth algorithm, and the other will run the Apriori algorithm.
  + Implement a mechanism to ensure that both threads run concurrently and independently.
* Algorithm Implementation:
  + Develop Python functions or classes to implement both the FP-growth and Apriori algorithms.
  + Allow the user to set minimum support and confidence thresholds as parameters for both algorithms.
* Parallel Execution:
  + Execute both algorithms in parallel using the threads created earlier.
  + Measure the execution time for each algorithm separately and record the results.
* Data Visualization:
  + Utilize a library like matplotlib to create a graph that compares the execution times of the FP-growth and Apriori algorithms.
  + Label the graph appropriately to distinguish between the two algorithms.
* Recommendation:
  + Based on the execution time comparison, recommend the best algorithm (FP-growth or Apriori) for market basket analysis to GroceryMall.
* Bonus:
  + Provide an option to mine association rules from the frequent itemsets generated by both algorithms and display them with their confidence values.
  + Allow the user to input both the minimum support and minimum confidence thresholds for association rule mining.

Notes:

* Use the "Groceries\_dataset.csv" dataset for testing your program.
* Ensure that your program is well-documented, and the code is clean and readable.
* Include comments explaining the logic of your code.
* Provide sample input data from the dataset and expected output for testing purposes.
* Calculate and compare execution times accurately to make a reliable algorithm recommendation to the company.