Bakery Transaction Forecast

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The objective of this study is to analyze the sales trend and product purchase pattern, eventually to help a local bakery (assuming it is in Edinburgh, UK based on the information on Kaggle) to make better forecasts of sales and to explore ideas to promote the sales.

The dataset consists of the transactions from a bakery in Edinburgh from October 2016 to April 2017. Specifically, it includes 4 variables, which are Date, Time, Transaction, and Item. The transaction variable describes the unique transaction ID of each transaction, while the item describes the products that were purchased in the transaction, such as coffee, muffin, and bread. Other features could be generated from the original variables, including weekends/weekdays, holiday/non-holiday, and morning/afternoon. Furthermore, based on the historical weather record of a weather station located in Edinburgh airport, we could introduce the weather-related features for each hour between October 2016 and April 2017. The weather-related features include the hourly average temperature, the relative humidity, the speed of the wind, and any significant weather events.

Before diving into the dataset, there are a few questions we would like to explore with the dataset:

1. Exploratory Analysis
    a. How do sales vary over the year, by the time in the day, and by the weekdays and weekends?
    b. Do sales peak during the holiday season? Which holiday has the highest sales?
    c. Which item is sold more frequently on a particular holiday?
    d. How do sales vary with the weather?
    e. What items do customers buy together?
    f. Which item is sold more frequently overall?
2. Modeling
    a. Knowing the weather forecast, what is the expected sales of certain products on a given day? More specifically, what are the expected sales on holidays?
    b. Which item will be bought with the other. For example, how likely a customer will purchase the third product (e.g. muffin) if he or she has already purchased two (e.g. coffee and cookie)?