



Vending Machine Logistics Prediction

Piya Pakdeechaturun
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Problems statement

Drink Vending machine with mix ingredients

need to improve **Availability** of each machine through supply chain

by predict transaction and planning to refill beforehand

Datasource

From one of our famous Drink vending machine transaction logs

- from 2023 October
- 15,634 rows
- 3 different machine

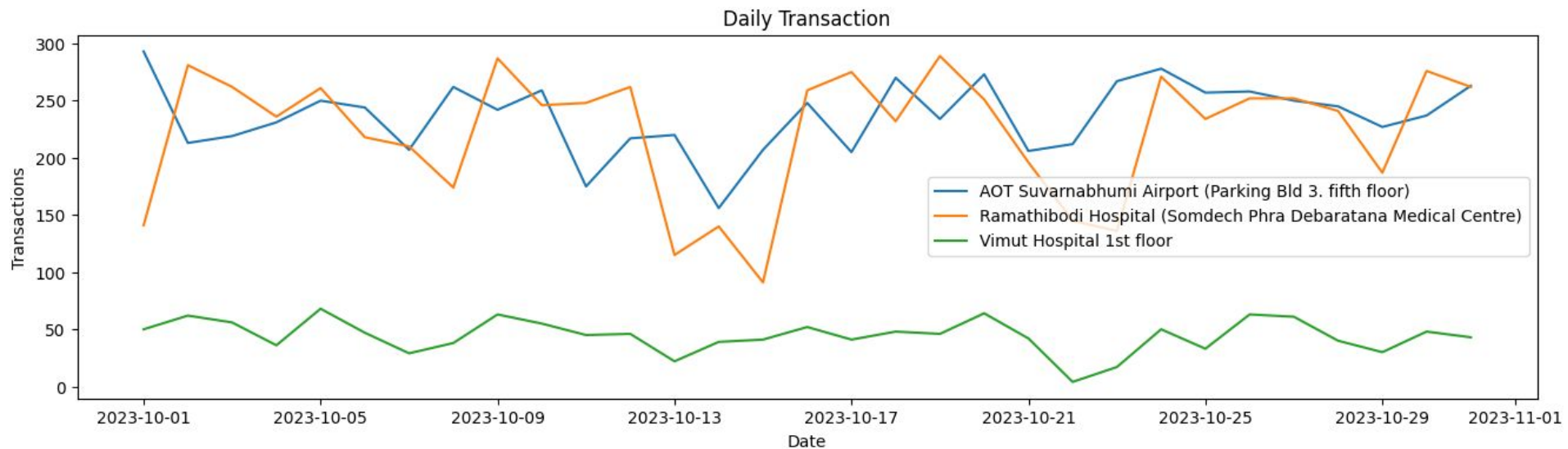
That included

- Drinking menu ordered
- Payment
- Campaign and promotion used
- Machine information

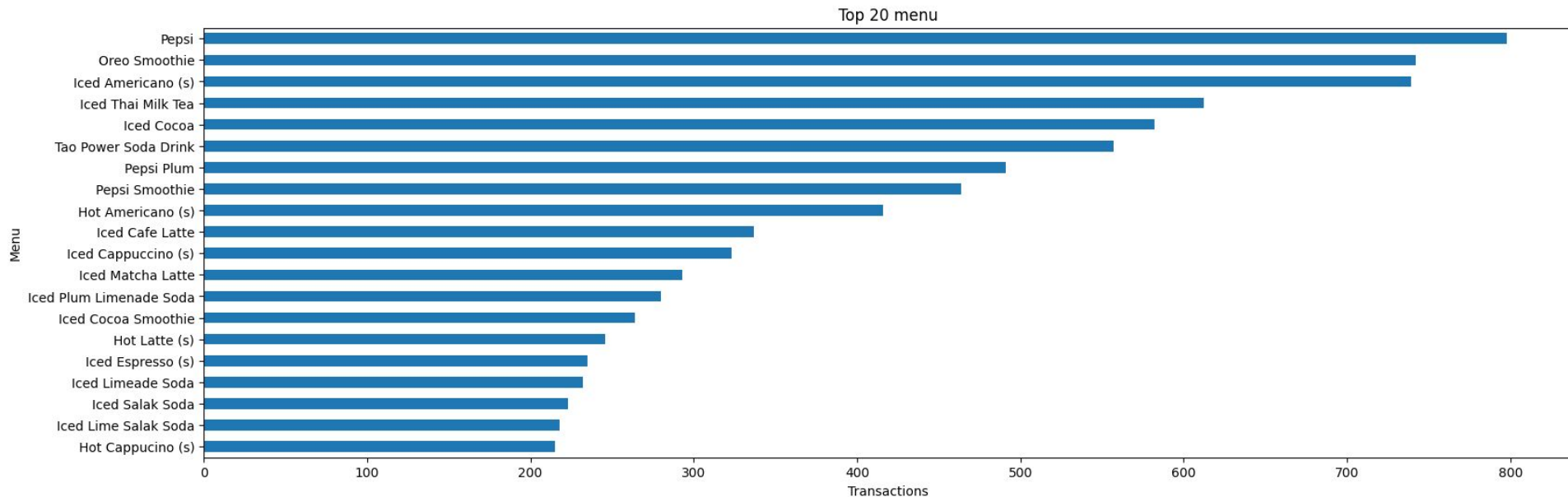


Without drinking menu's recipe for each ingredients

EDA



EDA

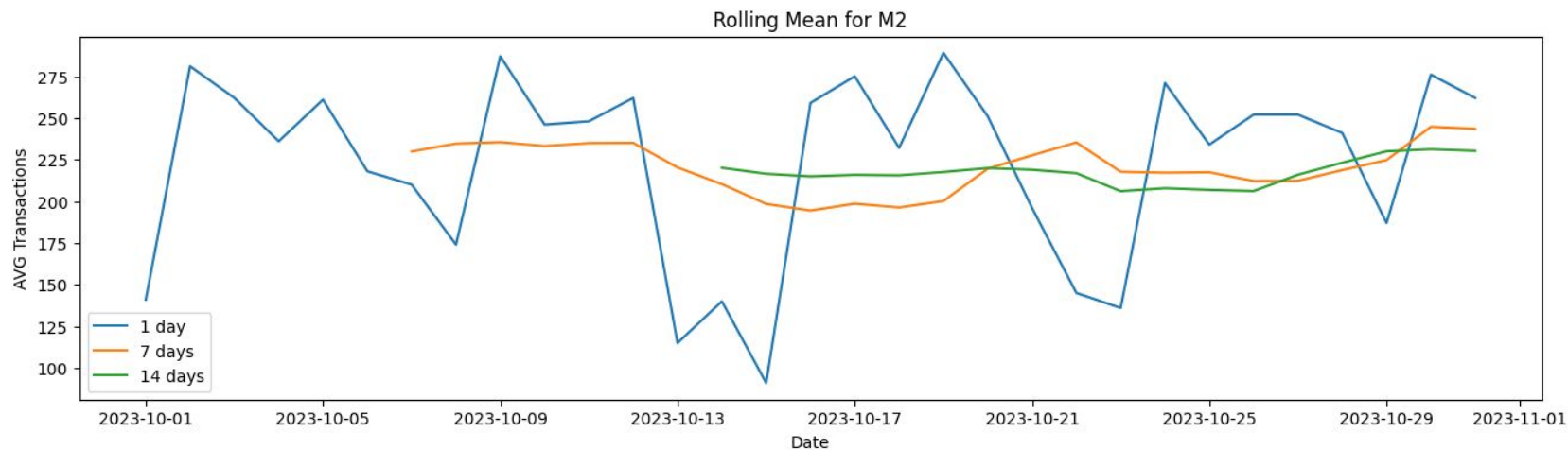


EDA - Daily Sampling

Re sampling data into `Daily`

and finding pattern by rolling mean

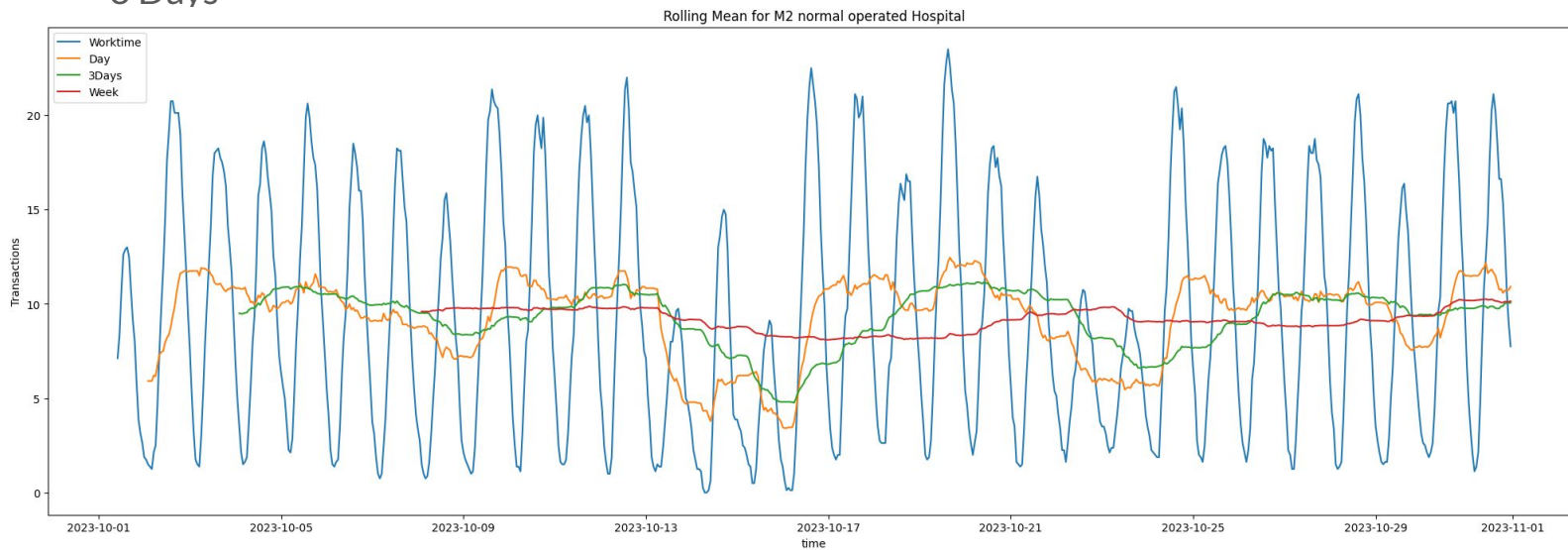
- 1 day
- 7 days
- 14 days



EDA - Hourly Sampling

Re sampling data into `Hourly` and finding pattern by rolling mean

- Worktime (8hours)
- Day
- 3 Days



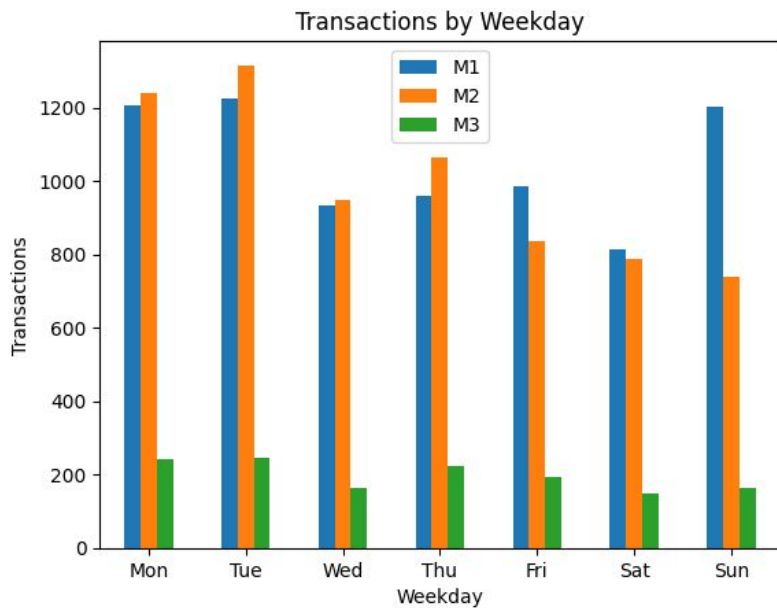


Feature Engineering

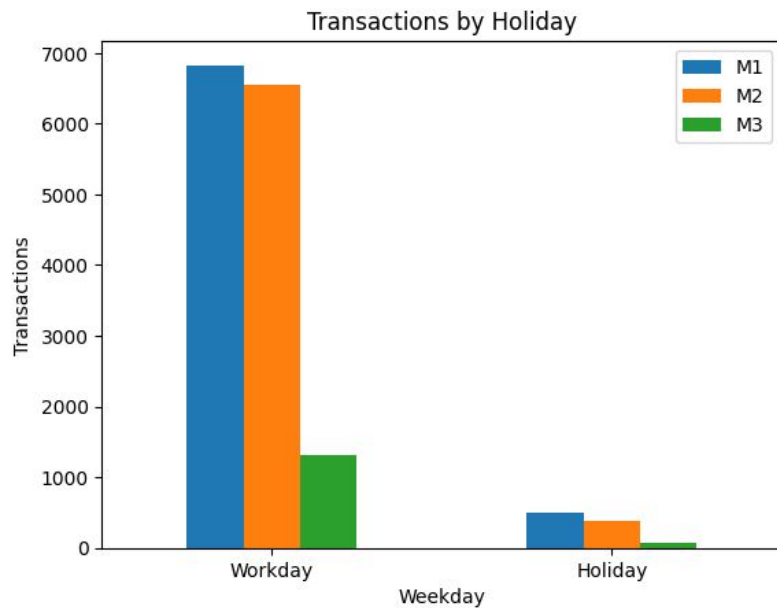
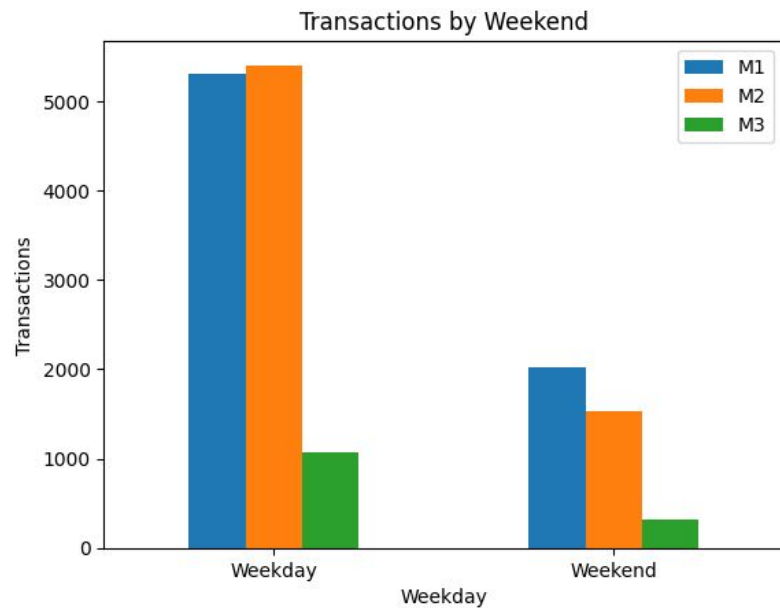
After resampling into Hourly

We create weekday, weekend, and holiday features into dataset

Feature Engineering



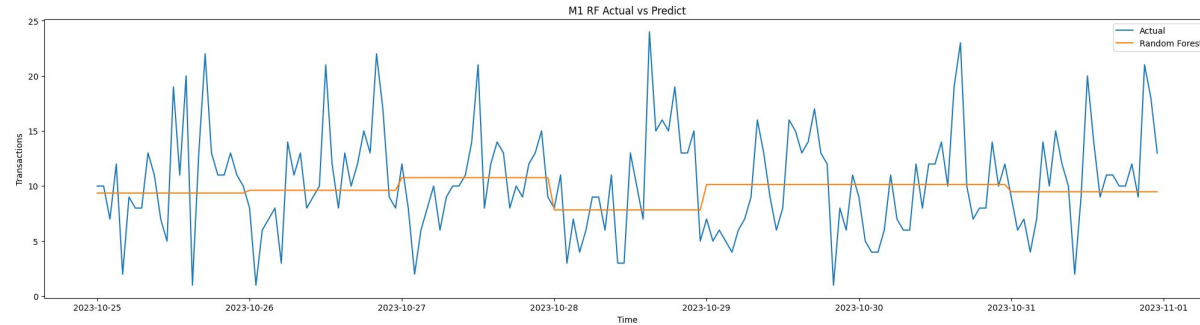
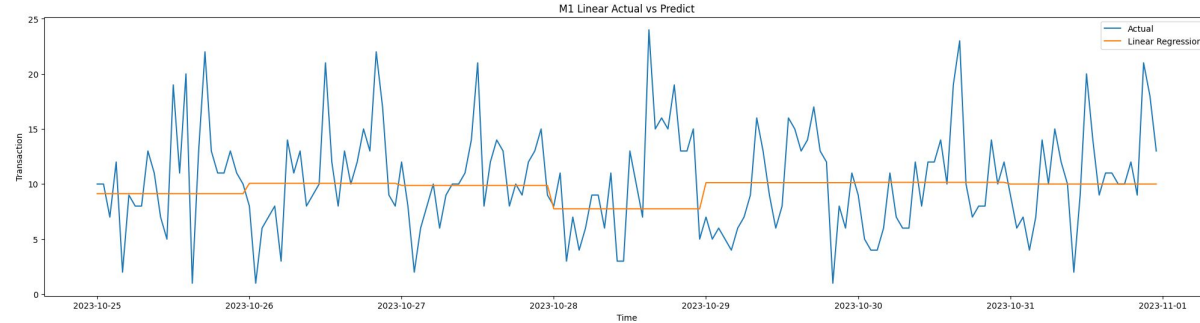
Feature Engineering



Modeling - Linear Regression

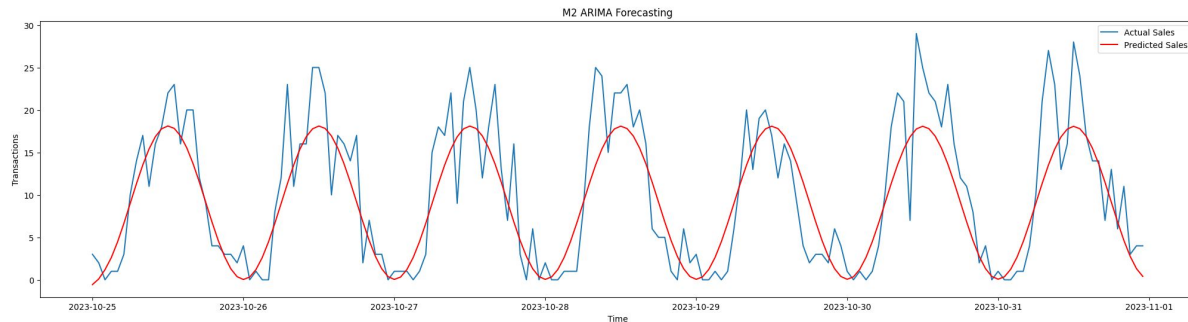
After we try Linear Regression
we found that `predict` is didn't
quite accurate enough for both

**Linear regression and
RandomForrest**

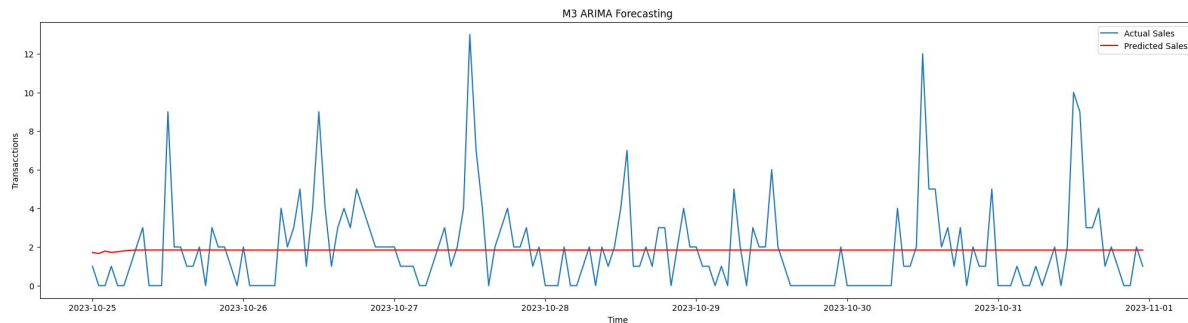


Modeling - ARIMA

For ARIMA best score seem able to capture trend for Machine that have period pattern

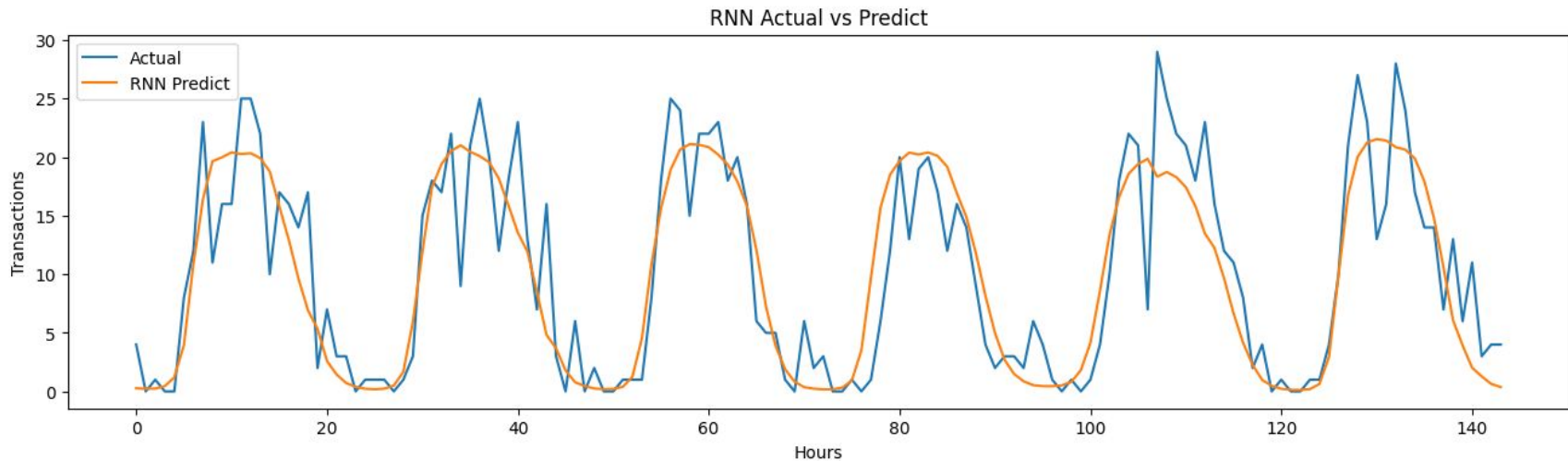


But for machine that various dynamic ARIMA seem can't capture trend



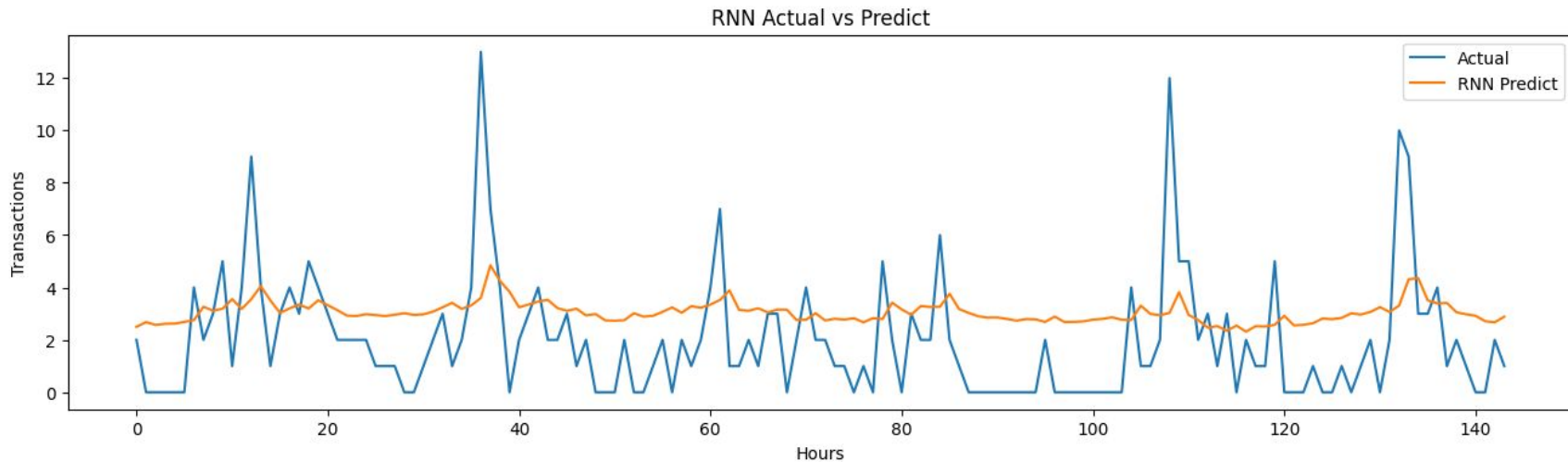
Modeling - RNN

RNN with LSTM model is better than ARIMA to follow trends for **M2** machine



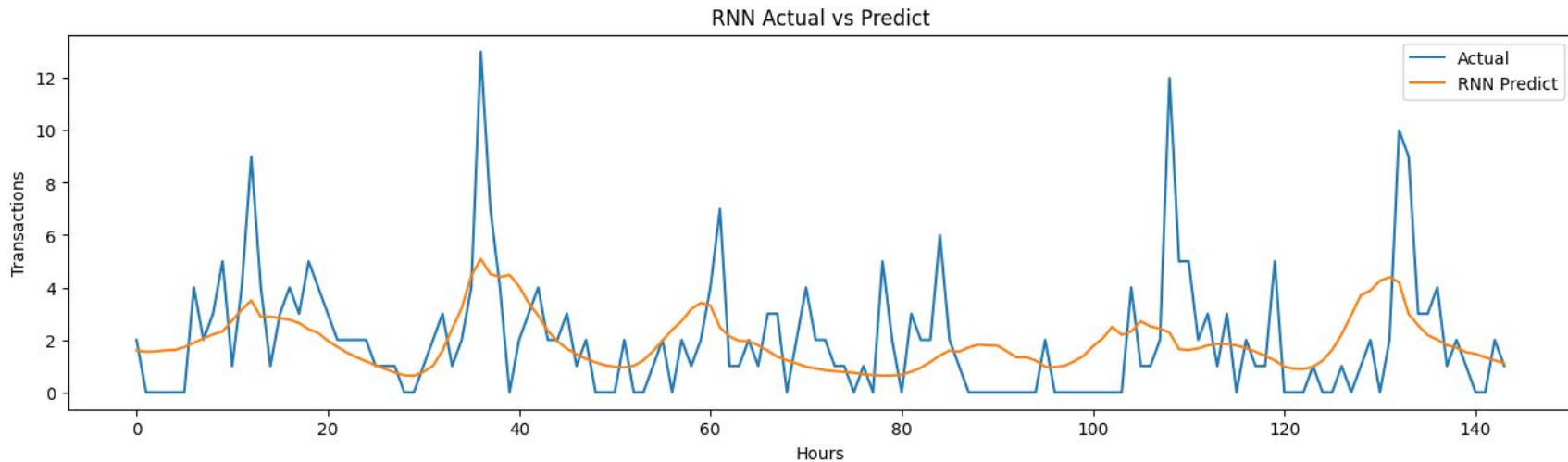
Modeling - RNN

But we still struggle at **M3** dataset



Modeling - RNN

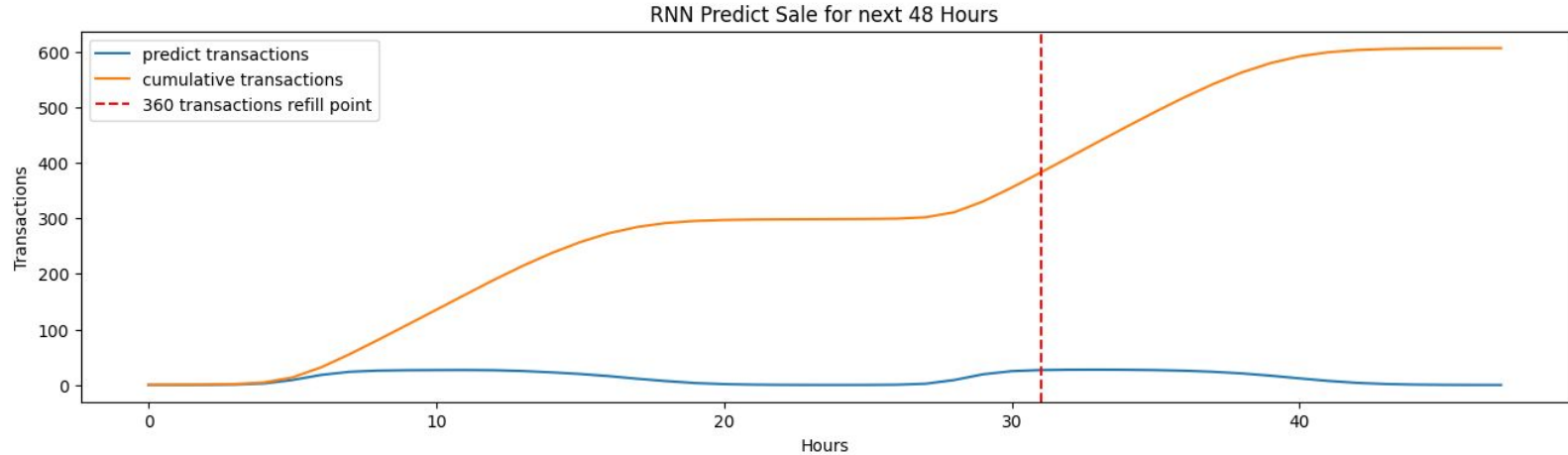
After add feature to RNN and adjust LSTM to support multi features **M3** predict better



Usage

After Training with each machine (or grouping machine type, place, building population)

We can predict next 48 hours to check when we should refill machine by setup cups sell threshold



Challenge

1. More different machine type and place (as of current 6,567 machines)
2. Change from **Machine** availability to **Drinking's Menu** availability Lack of menu recipe and machine capacity for each ingredients
3. When use this model predict next refill should assume that machine already full at the time model run prediction

The screenshot shows a mobile app interface for ordering coffee. At the top, there's a back arrow and a UK flag. Below is a coffee cup icon and the text 'ลาเต้เย็น' (Cold Latte) with 'โฟมบน, นมร้อน, เอสเพรสโซ่' (Foam on top, hot milk, espresso) underneath. The 'ประเภทเครื่องดื่ม' (Drink Type) section has a coffee icon and three options: 'ร้อน' (Hot), 'เย็น (+฿5)' (Cold +฿5), and 'ปั่น (+฿10)' (Blended +฿10). The 'เลือกระดับความหวาน' (Choose sweetness level) section has three radio buttons: 'น้ำตาล (Free)' (Sugar Free), 'น้ำผึ้ง (+฿5)' (Honey +฿5), and 'น้ำตาล 0 cal (+฿10)' (0 cal sugar +฿10). Below these are five buttons for sweetness levels: 'ไม่ใส่น้ำตาล' (No sugar), 'หวานน้อย' (Less sugar), '✓ หวานพอดี' (Just right sugar), 'หวานมาก' (More sugar), and 'หวาน3โลก' (3x sugar). The 'เพิ่มส่วนผสมพิเศษ' (Add special mix-ins) section has two items: 'เอสเพรสโซ่ 1 ช็อต (+฿15)' (1 shot espresso +฿15) and 'ท็อปปิ้งไอริชไอศูริว (+฿10)' (Irish cream topping +฿10), each with a checkbox. The 'หลอด และ ฟา' (Straw and foam) section has two items: 'รับหลอด' (Get straw) and 'รับฟา' (Get foam), each with a checkbox. At the bottom, there's a 'ยกเลิก' (Cancel) button and a 'ซื้อเลย' (Buy now) button with '฿35' next to it.



Future Work

1. Limit on Time series information to 1 month OCT if we can gather more so we can analysis trends and seasonal
2. Add more surrounding data to make more features eg. Weather, Building populations, Campaign and promotion
3. Finish this Proof of concept and pack into Application to use internal with MLOps

Q&A