Hotel Monte Carlo Simulation

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Introduction

Construct a hotel in New York city, then have an overview of average profit level, finally compare the influence of different elements

- ***Variables***

  Hotel Location, Price Level, Hotel Capability, Airport Shuttle Service

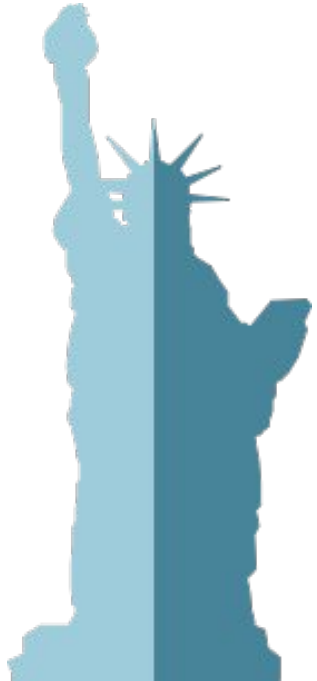
- ***Hypothesis***

(a) The closer to the city center, the more profit we can get.

(b) Time will have influence of the overall price level.

(c) The profit of different hotels will satisfy with normal distribution

(d) High frequency of shuttle service will increase hotel profit.



Introduction

OOP

- *Hotel*

  distance — distance of hotel from city center

  guestType — single, couple or family guest ratio of hotel, constant value

  priceSeed — lowest price of hotel and use it to estimate highest price

  roomNumber — room number of hotel

- *Shuttle*

  dayCost — hotel shuttle cost per day (including gas, driver salary)

  frequency — how many days can hotel offer shuttle service

Introduction

1. Total air passengers arrived at New York
2. Total guest may come to a certain hotel
3. Real booked room number
4. Generate random number of certain variables
5. Calculate revenue and cost

Reference

- *Hotel*

  distance — **random from [0,30]** (in miles)

  guestType — single : couple : family guest = **0.19 : 0.59 : 0.22**

  priceSeed — lowest price **random from [50,800]**

  roomNumber — the number of rooms in the hotel, **random from [50,2000]**

- *Shuttle*

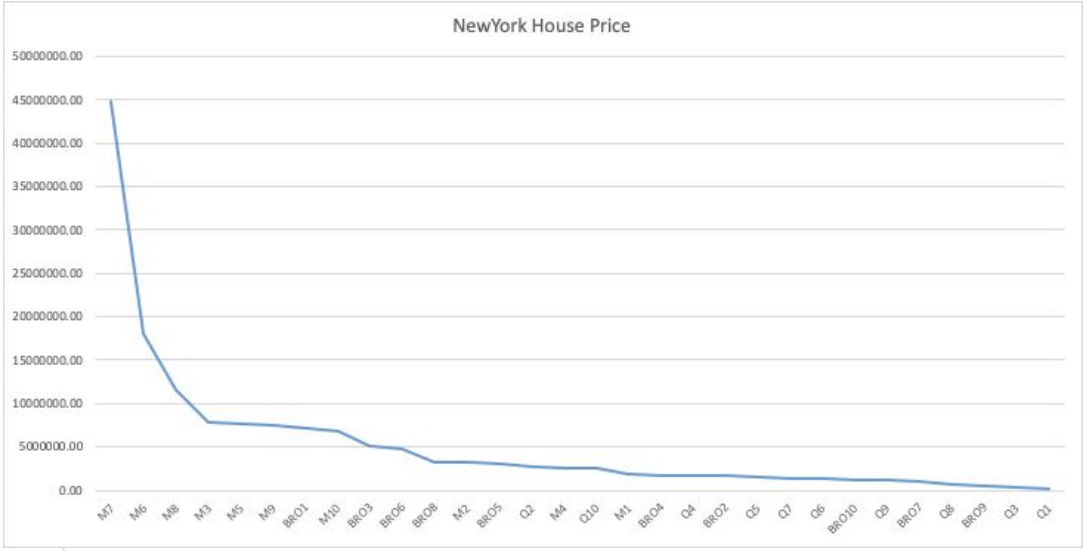
  dayCost — $**790**

  frequency — satisfy **binomial distribution**

Reference

- *Hotel **[distance]***— **The distance between the hotel and the center of NYC**

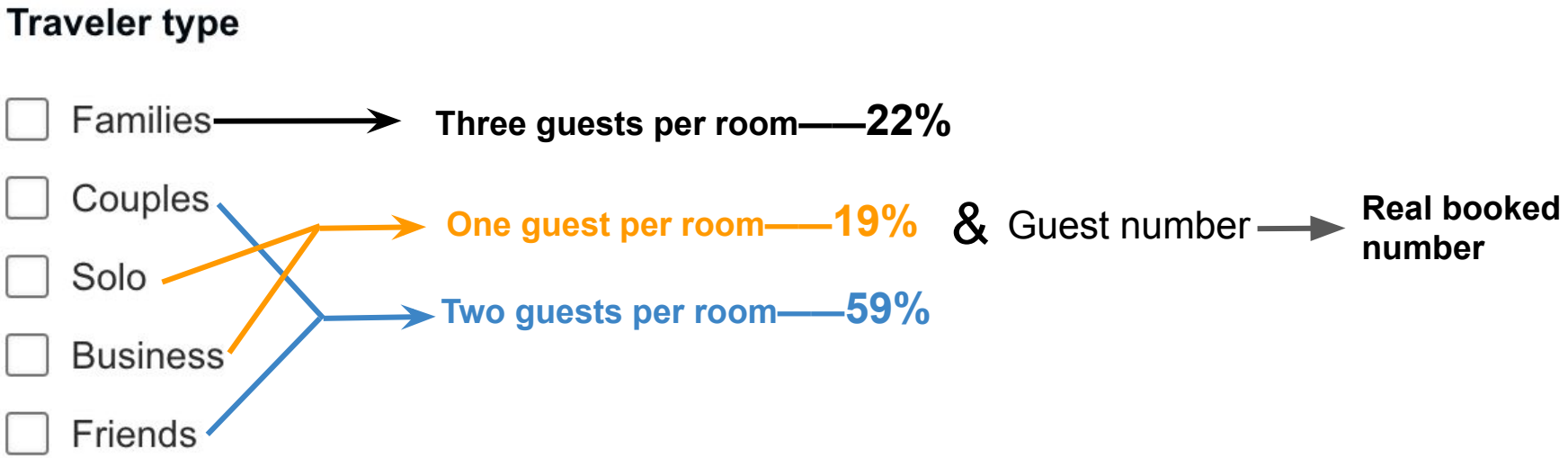
  Distance will have impacts on both **room cost** and **guest number**.



Reference

- *Hotel **[guestType]***— **Proportion of different types of tourists**

  Analyzing reviews collected from TripAdvisor website.



Reference

- *Hotel **[priceSeed]***— **The lowest price that used to generate the medium and high price**

priceSeed: [50,800]

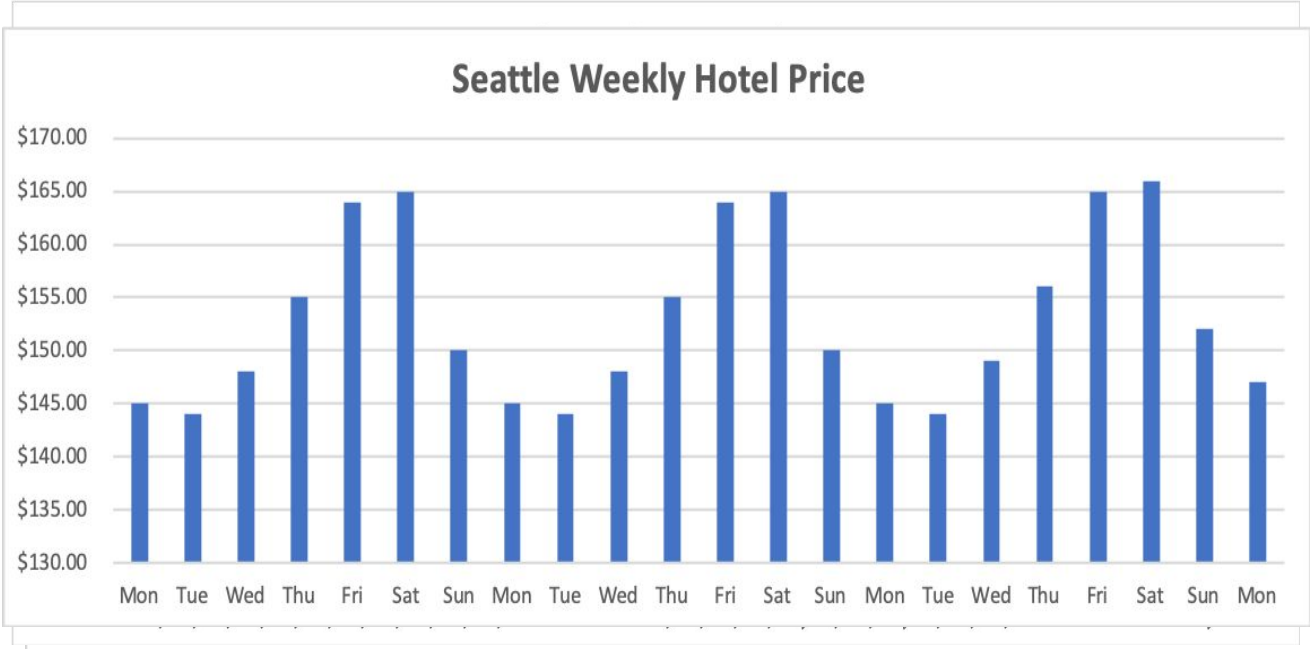
HighPrice: [2, 2.5] times

MidPrice: [1.5, 2] times

LowPrice: [1, 1.5] times

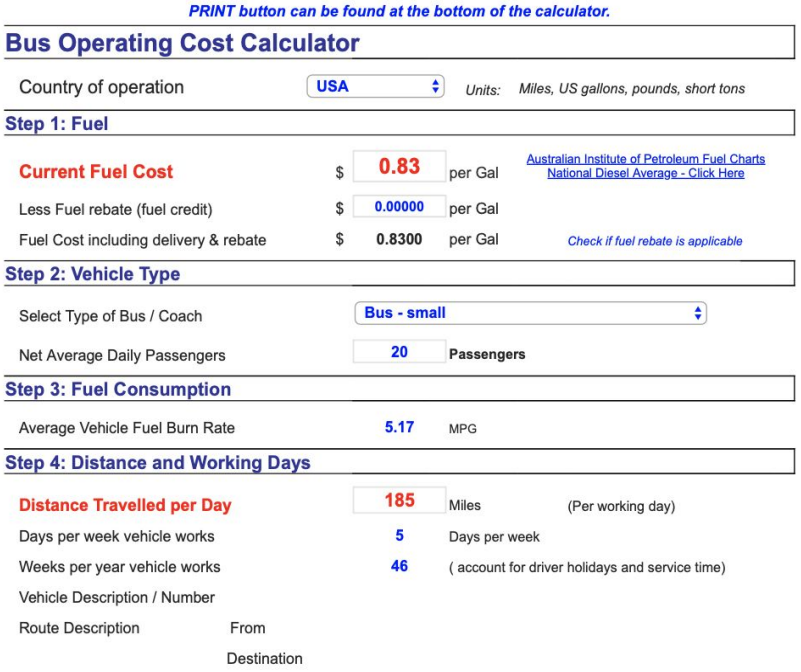
Price Level distribution:

[0.25, 0.5, 0.25]



Reference

- *Shuttle **[dayCost]***— **$790**



PRINT button can be found at the bottom of the calculator.

Bus Operating Cost Calculator

Country of operation: USA — *Units: Miles, US gallons, pounds, short tons*

Step 1: Fuel

Current Fuel Cost	$	0.83	per Gal	Australian Institute of Petroleum Fuel Charts National Diesel Average - Click Here
Less Fuel rebate (fuel credit)	$	0.00000	per Gal	
Fuel Cost including delivery & rebate	$	0.8300	per Gal	*Check if fuel rebate is applicable*

Step 2: Vehicle Type

Select Type of Bus / Coach	Bus - small	
Net Average Daily Passengers	20	**Passengers**

Step 3: Fuel Consumption

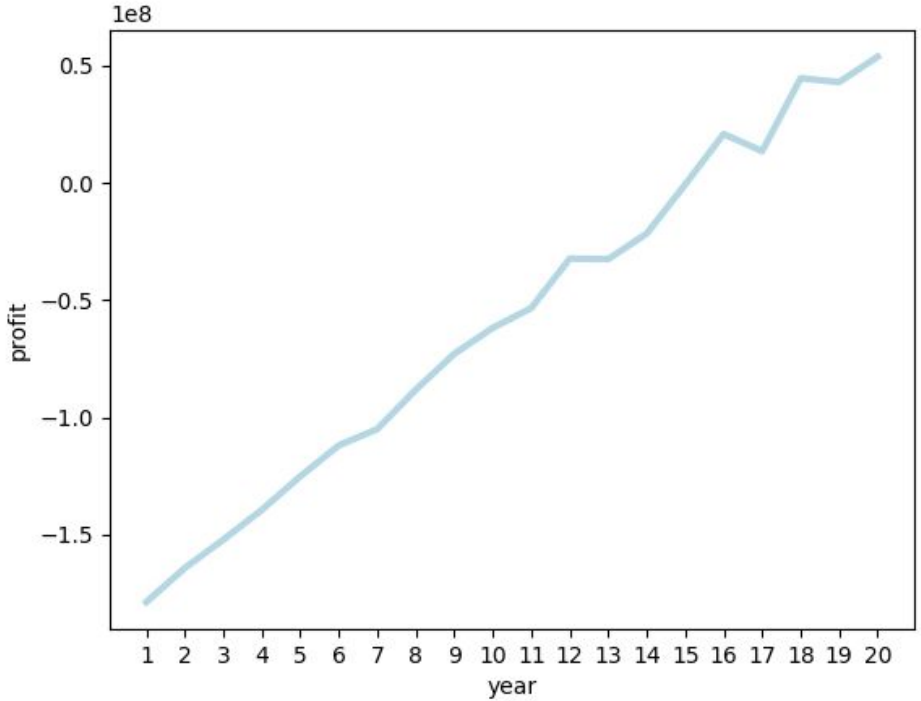
Average Vehicle Fuel Burn Rate	5.17	MPG

Step 4: Distance and Working Days

Distance Travelled per Day	185	Miles	(Per working day)
Days per week vehicle works	5	Days per week	
Weeks per year vehicle works	46	(account for driver holidays and service time)	
Vehicle Description / Number			
Route Description	From		
	Destination		

Bus operating cost calculator takes into account fuel, distance, fuel consumption rate, maintenance costs, fixed costs (eg: staff salaries, insurance, registration fees, etc.)

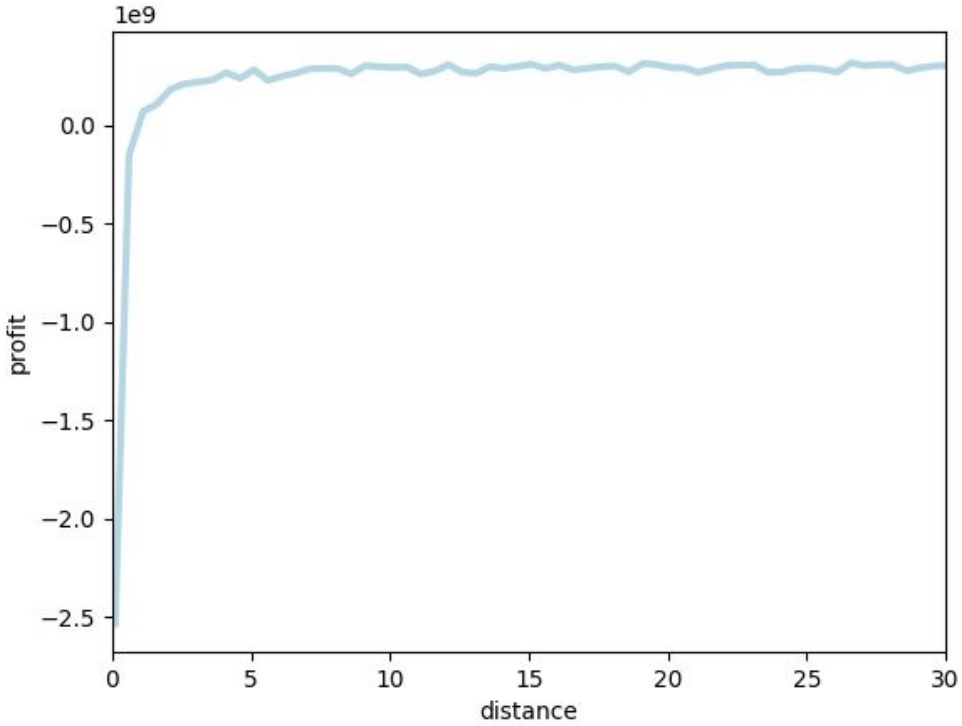
Conclusion



Time Simulation

On the average, operating a hotel may have a big cost at beginning, then gradually make profits.

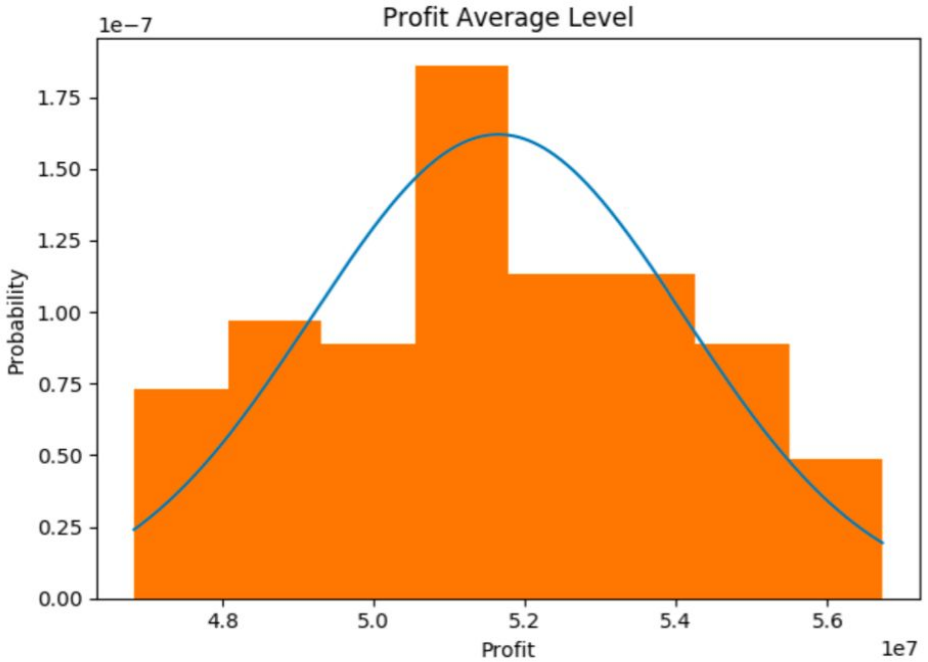
Conclusion



Distance Simulation

On the average, distance will have influence on profit, but the influence is obvious at beginning, and have no much influence when 5 miles away

Conclusion

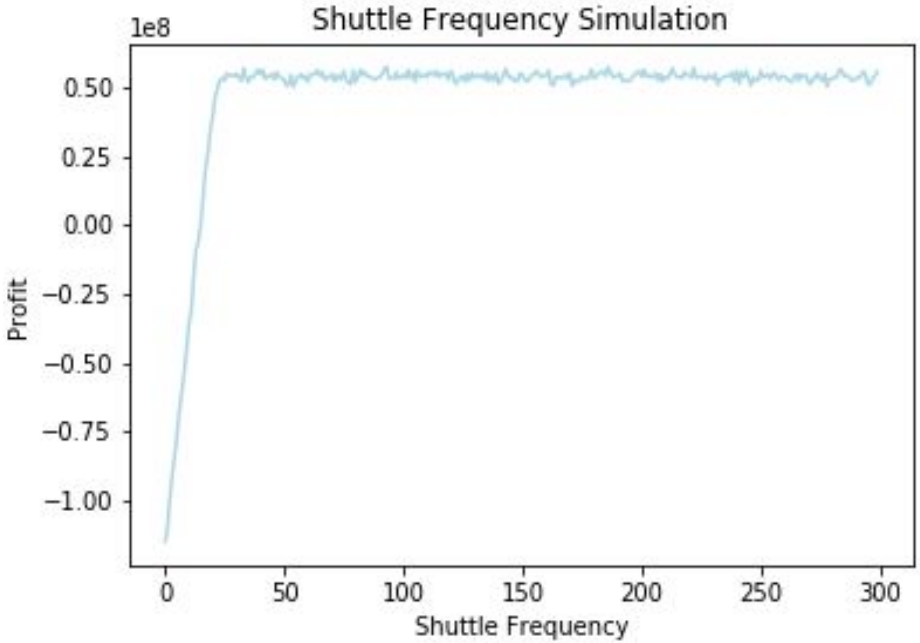


Profit Distribution

Profit distribution approximately obeys normal distribution.

The more times we do the simulation, the closer the profit distribution is to the normal distribution.

Conclusion



Shuttle Frequency Simulation

On the average, shuttle frequency will affect profit. As the shuttle frequency increases, so will the profits. The increase speed is fast at the beginning and slows down after a certain time node.

Future Work

1. **Incomplete Study**

   Some incomplete hypothesis

   More explanation of result

2. **Code Quality**

   Doctest and docstring

Thanks !

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