Portfolio Projects.

SILLY ICE CREAM

Analyze data with Matplotlib

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DATA ANALYST

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1. Introduction

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Silly’s Ice Cream Shop, owner shop right now is considering three different business strategies for next summer:

- Invest in a better weather tracking app to predict good weather days
- Close the shop one or two days a week to make staffing easier and more cost-effective
- Add more flavors to the menu to keep customers interested

1.1 Preview Data Frame

```
# import matplotlib, colormap, and pandas
from matplotlib import pyplot as plt
import pandas as pd

# load data
ic_data = pd.read_csv('icecream_data.csv')
```

```
# display graphs correctly
%matplotlib inline
#plt.rcParams['figure.figsize'] = (5, 3)
#plt.rcParams['figure.dpi'] = 75
```

```
ic_data.head()
```

	day	date	day_of_week	day_of_week_num	humidity_afternoon	max_temp	sales_error	sales_total	top_flavor
0	1	08-01	monday	0	61	86	4.37	619.89	coffee
1	2	08-02	tuesday	1	69	87	2.92	662.28	moosetracks
2	3	08-03	wednesday	2	62	81	4.28	604.46	coffee
3	4	08-04	thursday	3	64	88	4.32	667.19	coffee
4	5	08-05	friday	4	64	87	8.91	693.86	coffee

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2. Sales number for each day of the month

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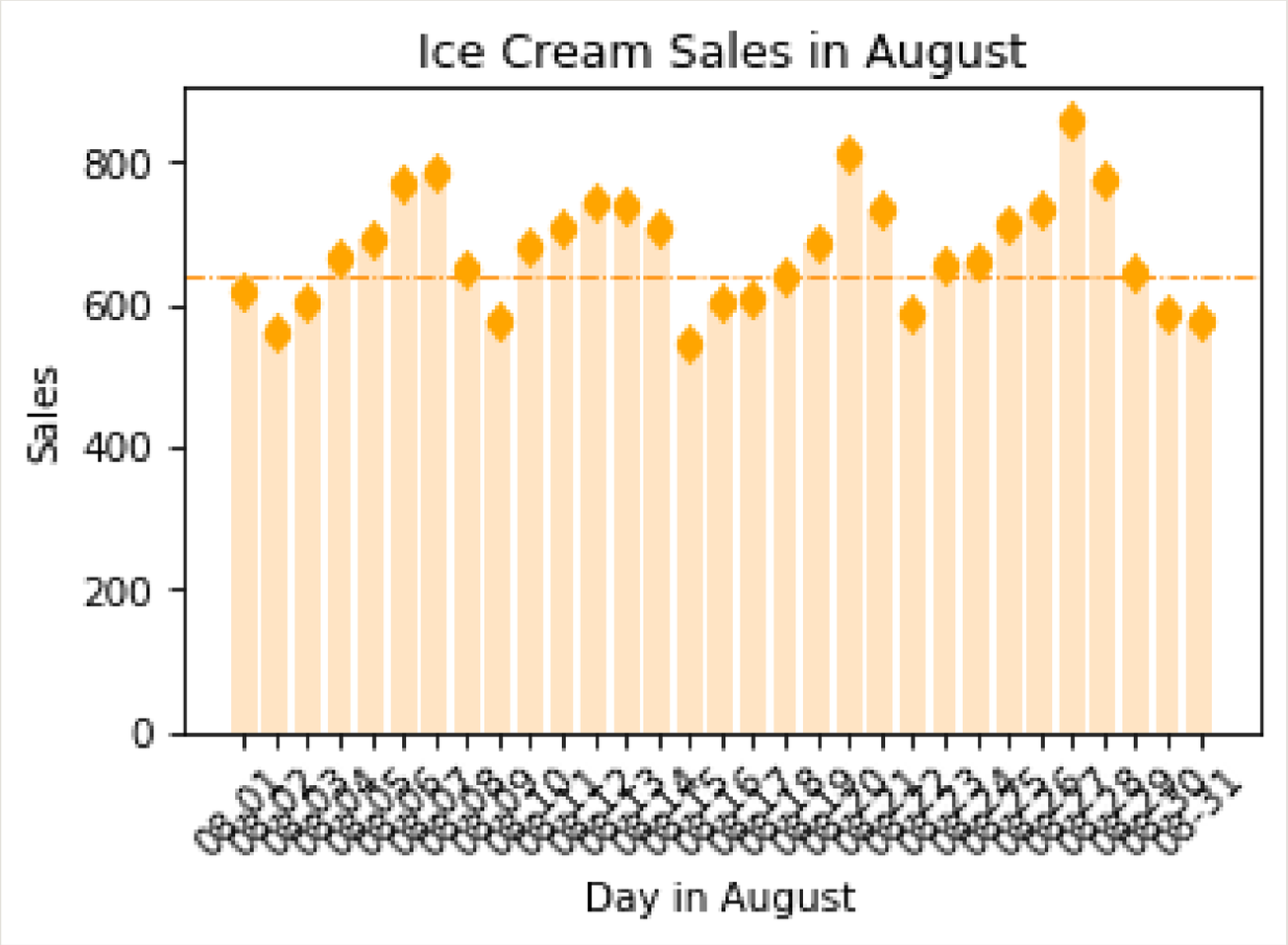
2.1 Total Sales of Ice Cream by day

First, make a bar chart to examine sales numbers for each day of the month. Owner's benchmark for a successful sales day is $640.

```
# make a bar chart

plt.bar(x=ic_data.date, height=ic_data.sales_total, width=0.8, color='bisque')
plt.axhline(y=640, xmin=0, xmax=1, linestyle='dashdot', color='darkorange', linewidth=0.8)
plt.errorbar(x=ic_data.date, y=ic_data.sales_total, yerr=ic_data.sales_error, fmt='o',
             uplims=True, lolims=True, color='orange')
plt.tick_params(axis='x', labelrotation=45)
plt.title('Ice Cream Sales in August')
plt.xlabel('Day in August')
plt.ylabel('Sales')
plt.show()
```


Ice Cream Sales in August
800
600
400
200
0
Sales
Day in August

2.2 Average Sales of Ice Cream by Day

Create a new dataframe named ***avg_by_day***. This script groups the sales data by day of the week and returns the average sales data for each day, so that we can make one averaged bar for each day

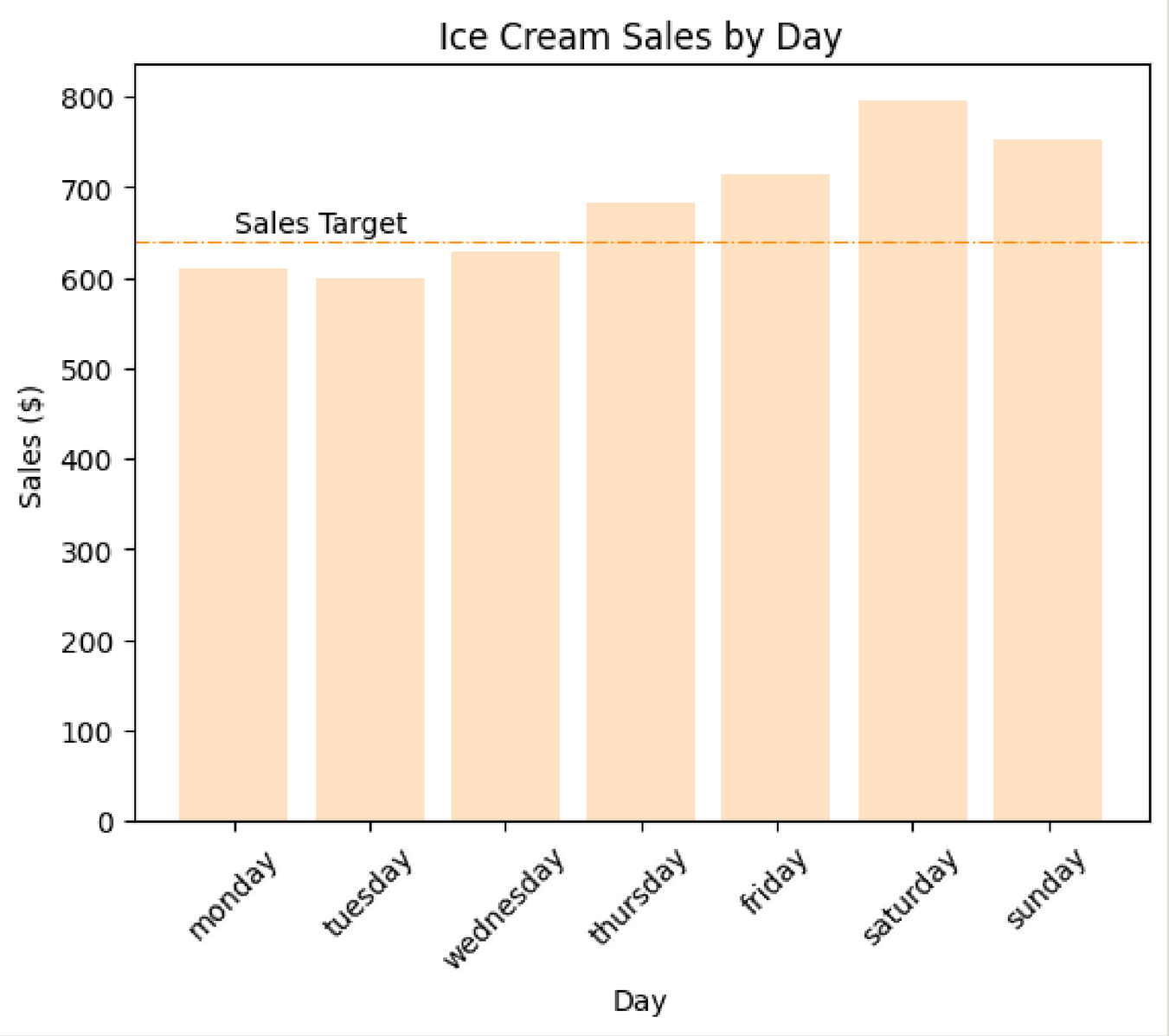
```
# create our averaged bar graph data
avg_by_day = ic_data.groupby([ic_data['day_of_week_num'], ic_data['day_of_week']])['sales_total'].mean()
avg_by_day = avg_by_day.droplevel(0,'index').reset_index(name='sales_avg')
avg_by_day
```

	day_of_week	sales_avg
0	monday	609.6780
1	tuesday	697.8600
2	wednesday	627.3640
3	thursday	681.6625
4	friday	714.4100
5	saturday	796.4200
6	sunday	761.6660

Using our new ***avg_by_day*** dataframe, we can make a bar chart by day of the week to help the owner see which day has the best sales, and which the worst.

```
# make a bar chart by day of the week
plt.bar(x=avg_by_day.day_of_week, height=avg_by_day.sales_avg, width=0.8, color='bisque')
plt.axhline(y=640, xmin=0, xmax=1, linestyle='dashdot', color='darkorange', linewidth=0.8)
plt.annotate('Sales Target', xy=(0,650))
plt.tick_params(axis='x', labelrotation=45)

plt.title('Ice Cream Sales by Day')
plt.xlabel('Day')
plt.ylabel('Sales ($)')
plt.show()
```



Based on the bar chart, we can see sales on monday, tuesday and wednesday is below sales target ($640) and they have just a little different.

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3. Top Selling Ice Cream Flavor

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3.1 Most famous Flavor in August

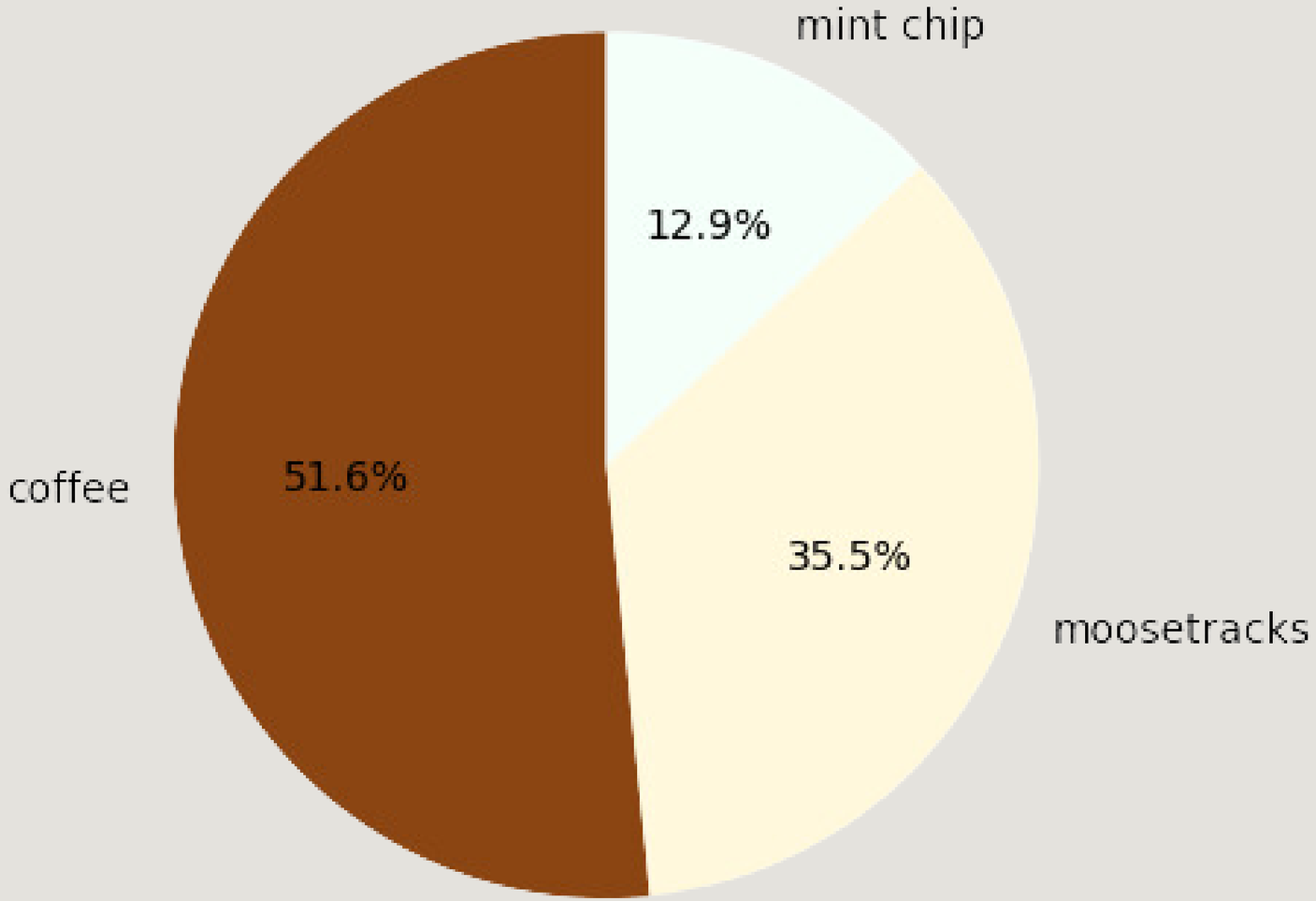
Silly's serves 16 flavors of ice cream and they already put the top selling flavor for each day in August. Now, we gonna make new data frame by count flavor for each day.

```
# moosetracks is vanilla ice cream with mini peanut butter cups and fudge swirled in
popular_flavors = ic_data.top_flavor.value_counts().rename_axis('flavor').reset_index(name='count')
popular_flavors
```

	flavor	count
0	coffee	16
1	moosetracks	11
2	mint chip	4

3.2 Pie chart for each flavor

```
# pie chart
plt.pie(x=popular_flavors['count'], labels=popular_flavors.flavor, startangle=90,
        colors=['saddlebrown', 'cornsilk', 'mintcream'],  autopct='%1.1f%%')
plt.show()
```



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4. Effect of Temperature & Humidity on Ice Cream Sales

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4.1 Impact of weather on sales

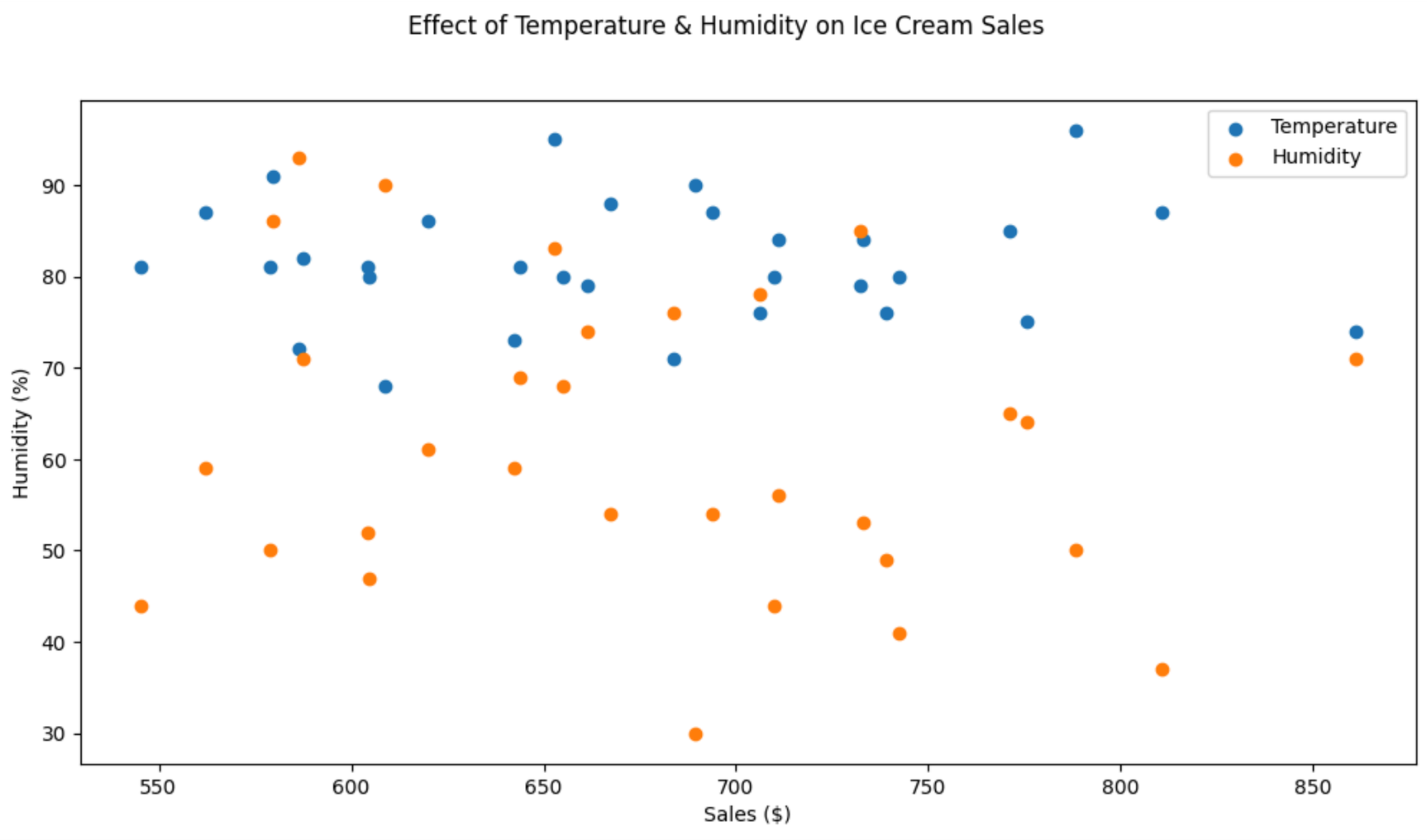
Make two scatterplots in subplots to compare the effect of temperature on ice cream sales, and the effect of humidity on ice cream sales.

We gonna see if weather give impact on sales of ice cream or not.

```
# scatterplot
plt.rcParams['figure.figsize'] = (12, 6)

plt.suptitle('Effect of Temperature & Humidity on Ice Cream Sales')
plt.scatter(x=ic_data.sales_total, y=ic_data.max_temp)
plt.ylabel('Temperature (F)')
plt.xlabel('Sales ($)')

plt.scatter(x=ic_data.sales_total, y=ic_data.humidity_afternoon)
plt.ylabel('Humidity (%)')
plt.xlabel('Sales ($)')
plt.legend(['Temperature', 'Humidity'])
plt.show()
```



Scatter plot show no obvious pattern trend. So we can conclude that weather not give a significant effect on ice cream sales.

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5. Sales Total Distribution

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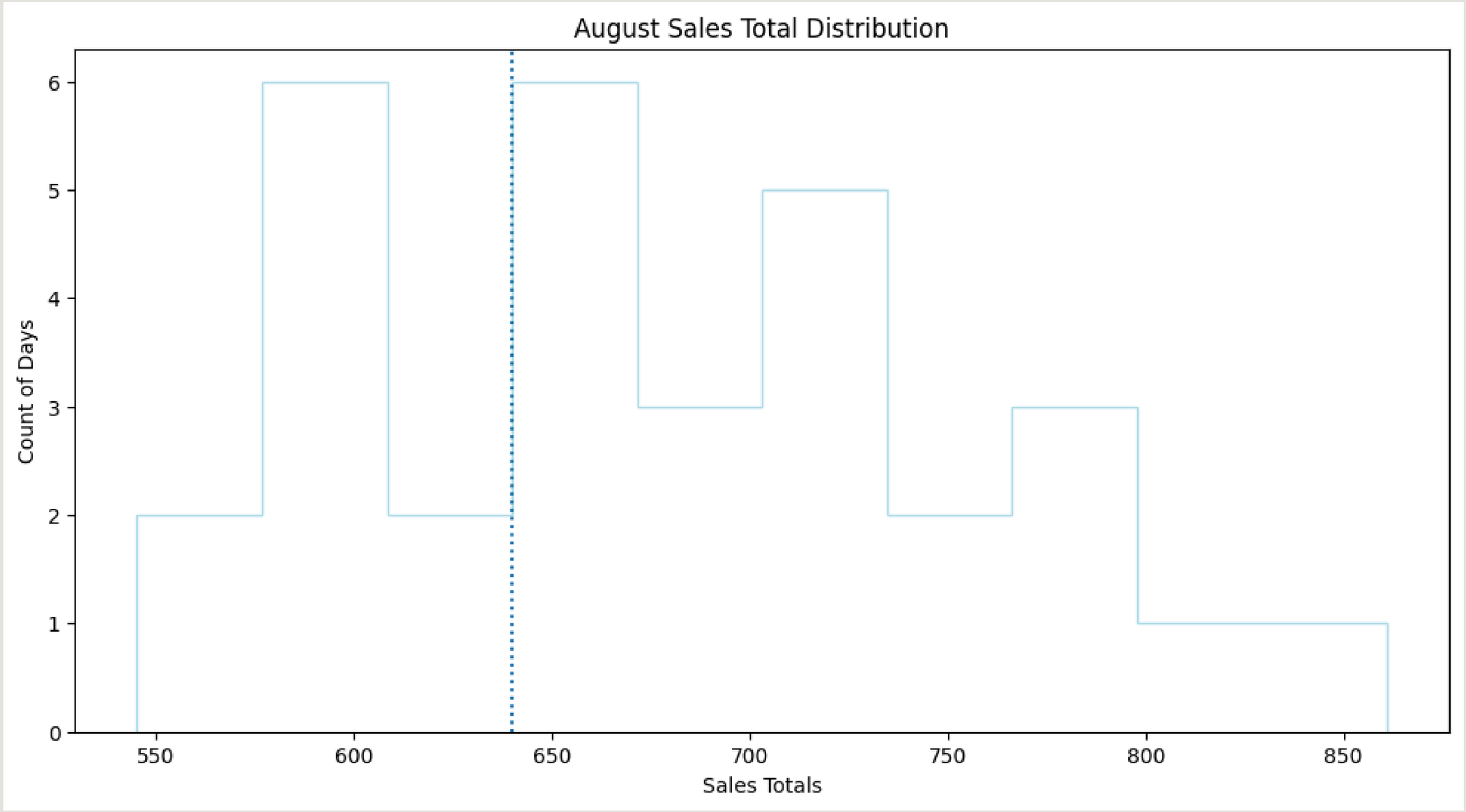
5.1 Sales Total Distribution

Let's see how the sales data is distributed.

```
#histogram
plt.hist(x=ic_data.sales_total, bins=10, color='powderblue', align='mid', histtype='step')
plt.axvline(x=640, ymin=0, ymax=1, linestyle='dotted')
plt.title('August Sales Total Distribution')
plt.xlabel('Sales Totals')
plt.ylabel('Count of Days')

plt.show()
```


August Sales Total Distribution
Count of Days
0
1
2
3
4
5
6
550
600
650
700
750
800
850
Sales Totals

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6. Conclusion

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6.1 Conclusion

In answer three different business strategies for next summer:

- **Invest in a better weather tracking app to predict good weather days**

There seems to be no strong correlation between temperature or humidity and sales, so investing in a better weather app doesn't seem like a good use of resources.

- **Close the shop one or two days a week to make staffing easier and more cost-effective**

Based on the charts, it seems like changing the shop's hours will have the biggest impact on the business. The bar graph shows that on average, the shop doesn't reach its $640 sales target on Mondays, Tuesdays and Wednesdays, so it might benefit Silly's to close on at least one of those days.

- **Add more flavors to the menu to keep customers interested**

Finally, just 3 flavors out of 16 made it into the top-seller category, so it seems like customers have favorite flavors and stick with them. However, more data is probably necessary to answer this question, since our data really only tells us that Coffee and Moosetracks are consistently popular flavors, not whether customers would like to try other flavors.