P1- Analyzing the NYC Subway Dataset - Statistical Test

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Mann-Whitney U Test

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In [1]: # Import commonly used libraries
        import pandas
        import numpy
        import scipy
        import scipy.stats
        from ggplot import *
        %matplotlib inline
```

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In [2]: # Create a DataFrame to store the turnstile and weather data.
        allData = pandas.read_csv ("turnstile_data_master_with_weather.csv")
```

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In [3]: # Subdivide the data based on whether or not ir is raining
        withRain = allData['ENTRIESn_hourly'][allData['rain'] == 1]
        print 'With Rain Sample Size:', withRain.size
        withoutRain = allData['ENTRIESn_hourly'][allData['rain'] == 0]
        print 'Without Rain Sample Size:', withoutRain.size
```

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With Rain Sample Size: 44104
Without Rain Sample Size: 87847
```

```
In [4]: # Calculate the ridership mean on rainy days
        print 'With Rain ENTRIESn_hourly Mean:', numpy.mean(withRain)
        # Calculate the ridership mean on non rainy days
        print 'Without Rain ENTRIESn_hourly Mean:', numpy.mean(withoutRain)
```

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With Rain ENTRIESn_hourly Mean: 1105.44637675
Without Rain ENTRIESn_hourly Mean: 1090.27878015
```

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In [7]: # Is the data normal or non-normal?
        # Normally, the Shapiro-Wilk test would be used to determine if the data
        # is normal, but the test is not reliable on samples sizes greater than
        # 5000.  So, a visual inspection of the data will be used to determine if
        # the withRain and withoutRain data are normal using ggplot histogram.
        ggplot(allData, aes(x='ENTRIESn_hourly', color='rain')) + \
            geom_histogram(binwidth=250) + \
            ggtitle('Histogram of ENTRIESn_hourly')
```

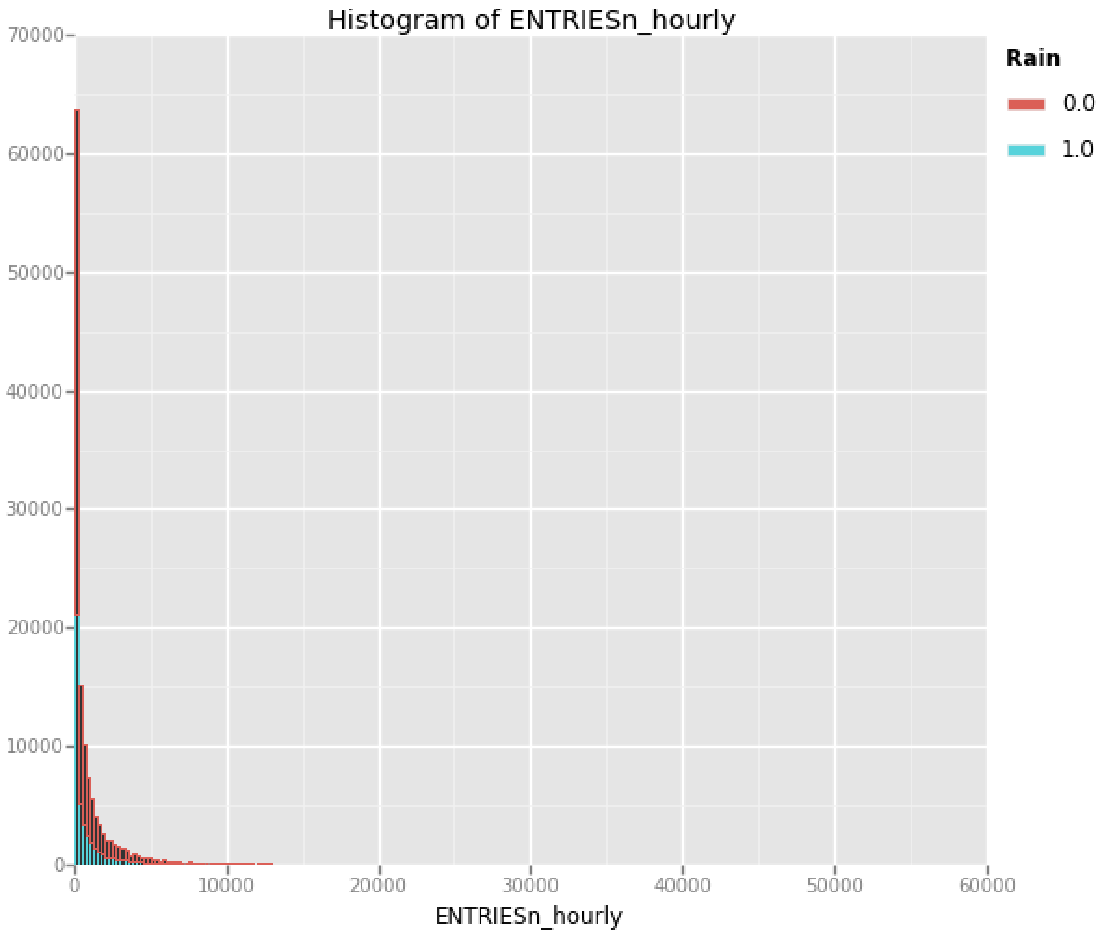

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Out[7]: <ggplot: (4051435)>
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In [6]: # As shown above, the histogram shows a non-normal distribution.
        # The Mann Whiteney U Test is a non-parametric test suitable for
        # the non-normal data.

        # Calculate the Mann Whitney U Test,
        # doubling the p-value to reflect a two-tailed test
        (U, p) = scipy.stats.mannwhitneyu(withRain, withoutRain)
        print ’The Mann-Whitney statistic =’, U
        print ’One-tailed p =’, p
        p = p * 2
        print ’Two-tailed p =’, p

        # Test p to determine if we should accept or reject the hypothesis
        if p < 0.05:
            print ’Reject the null Hypothesis’
        else:
            print ’Accept the null Hypothesis’
```

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The Mann-Whitney statistic = 1924409167.0
One-tailed p = 0.0193096344138
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Two-tailed p = 0.0386192688276
Reject the null Hypothesis
```