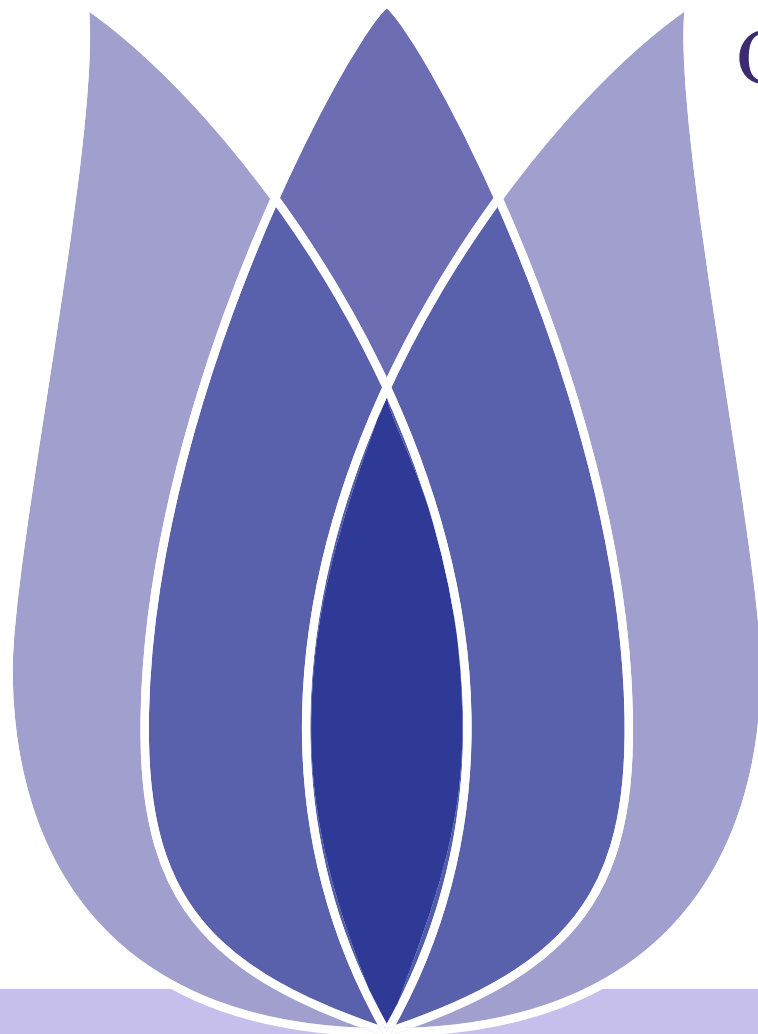


Bike Sharing Demand

YAO

Chongqing University of Posts and Telecommunications test

July 18, 2023





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Problem Definition test



Bike Sharing Demand

Problem Definition test
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Defn	The goal XXX this project is to forecast bike rental demand given the input feature like the duration of travel, departure location, arrival location, and time elapsed.
Defn	<p>Evaluation metrics: RMSLE(Root Mean Squard Logarithmic Error) is required to evaluate the model.</p> $RMSLE = \sqrt{\frac{1}{n} \sum_{i=1}^n [\log(p_i + 1) - \log(a_i + 1)]^2}$ <p>n is the number of test set samples, pi is the test value, and ai is the actual value. When the root mean square error is smaller, it means that the fitting effect of the data is better and the test value is closer to the actual value.</p>



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Data Clean



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Defn

You are provided hourly rental data spanning two years. For this competition, the training set is comprised of the first 19 days of each month, while the test set is the 20th to the end of the month. You must predict the total count of bikes rented during each hour111covered by the test set, using only information available prior to the rental

- **train.csv** It contains a training set of target variables.
- **test.csv** It does not contain a training set of target variables.
- **sampleSubmission.csv** It is a properly formatted sample submission file.



Data Describe

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- **datetime** - hourly date + timestamp
- **season** - 1 = spring, 2 = summer, 3 = fall, 4 = winter
- **holiday** - whether the day is considered a holiday
- **workingday** - whether the day is neither a weekend nor holiday
- **weather** - 1: Clear, Few clouds, Partly cloudy, Partly cloudy
2: Mist + Cloudy, Mist + Broken clouds, Mist + Few clouds, Mist
3: Light Snow, Light Rain + Thunderstorm + Scattered clouds, Light Rain + Scattered clouds
4: Heavy Rain + Ice Pallets + Thunderstorm + Mist, Snow + Fog
- **temp** - temperature in Celsius
- **atemp** - "feels like" temperature in Celsius
- **humidity** - relative humidity
- **windspeed** - wind speed
- **casual** - number of non-registered user rentals initiated
- **registered** - number of registered user rentals initiated
- **count** - number of total rentals



TULIP

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Data Describe

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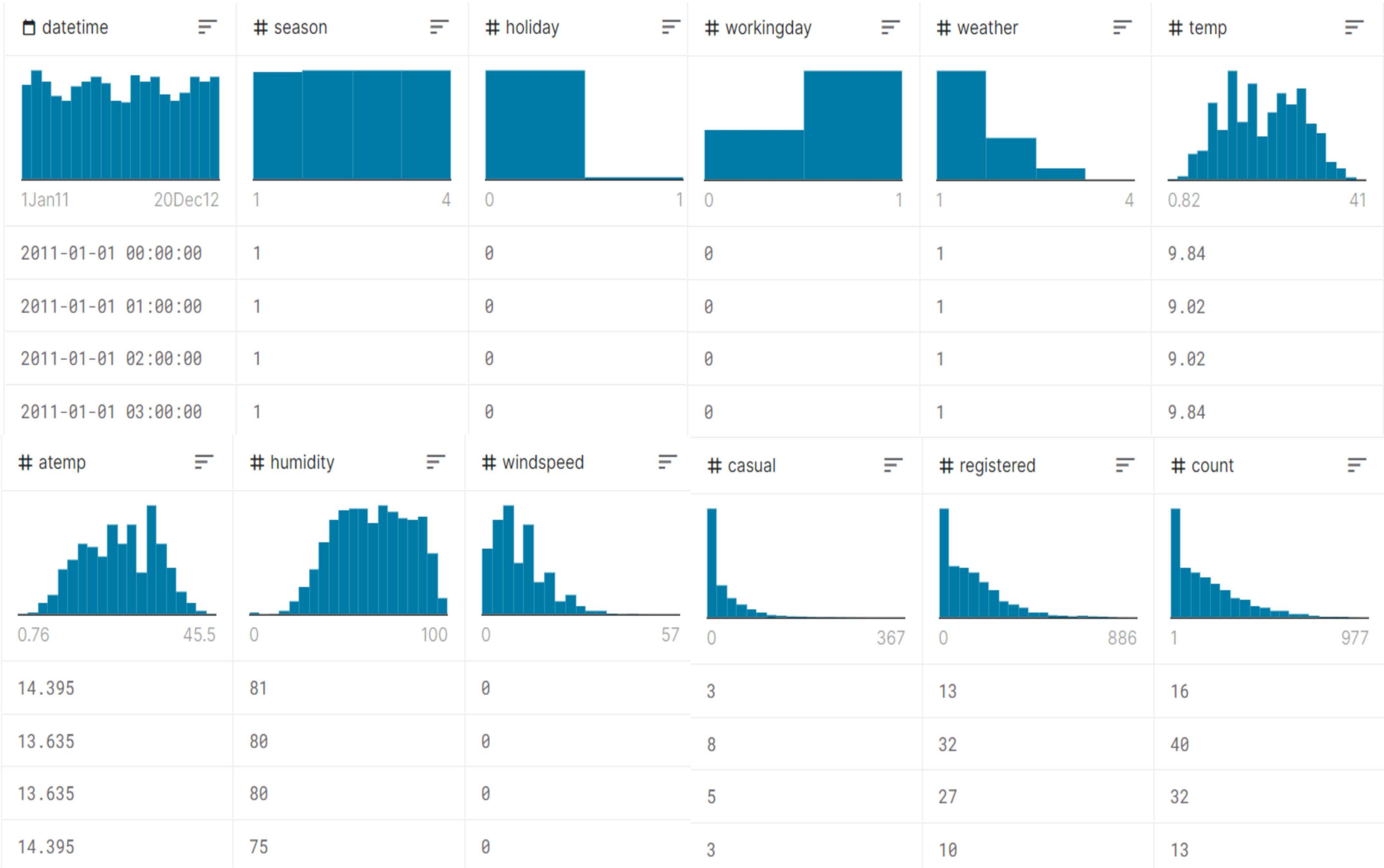


Figure 1: Describe



Data Visualization Plot

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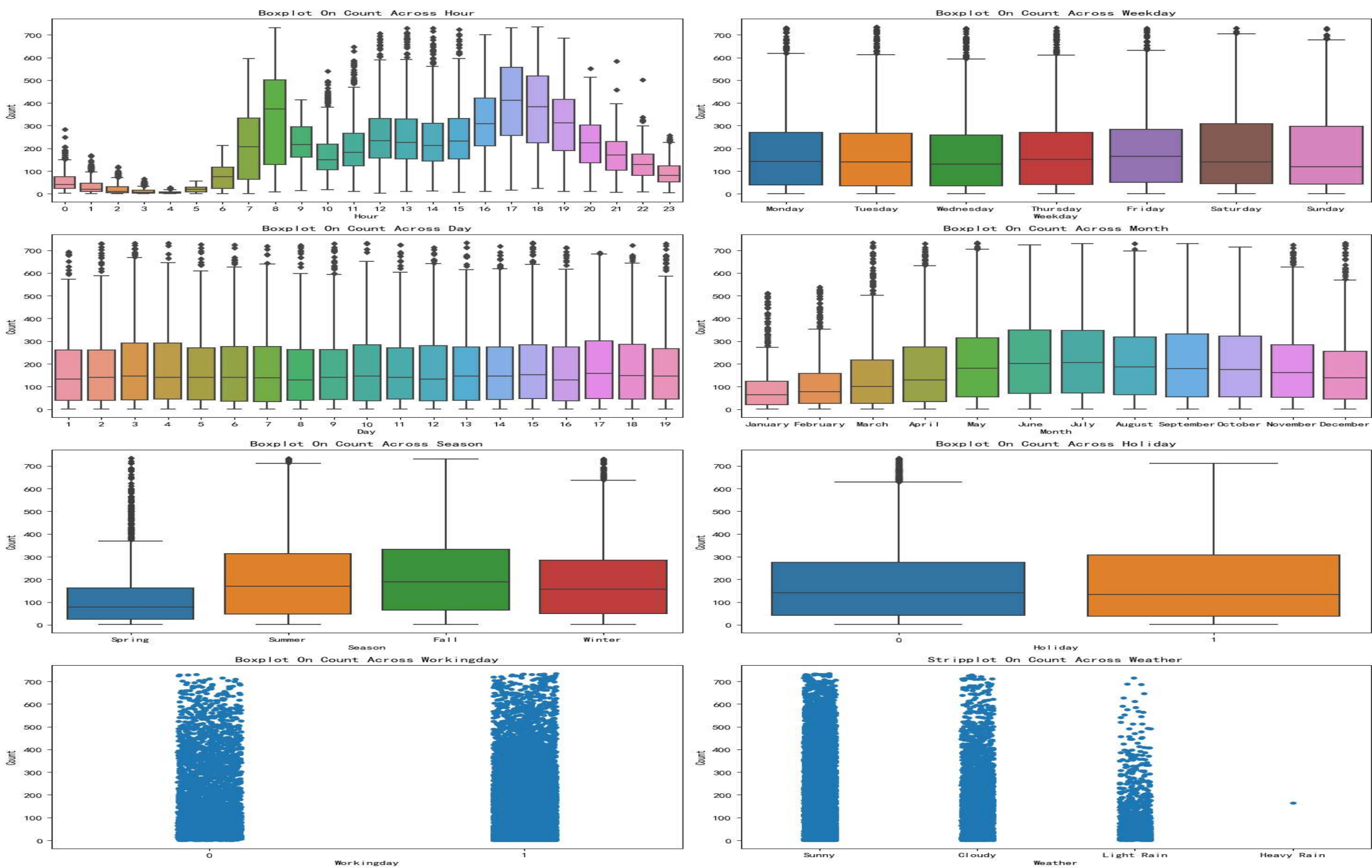


Figure 2: Box Plot and Scatter Plot



Data Visualization Plot

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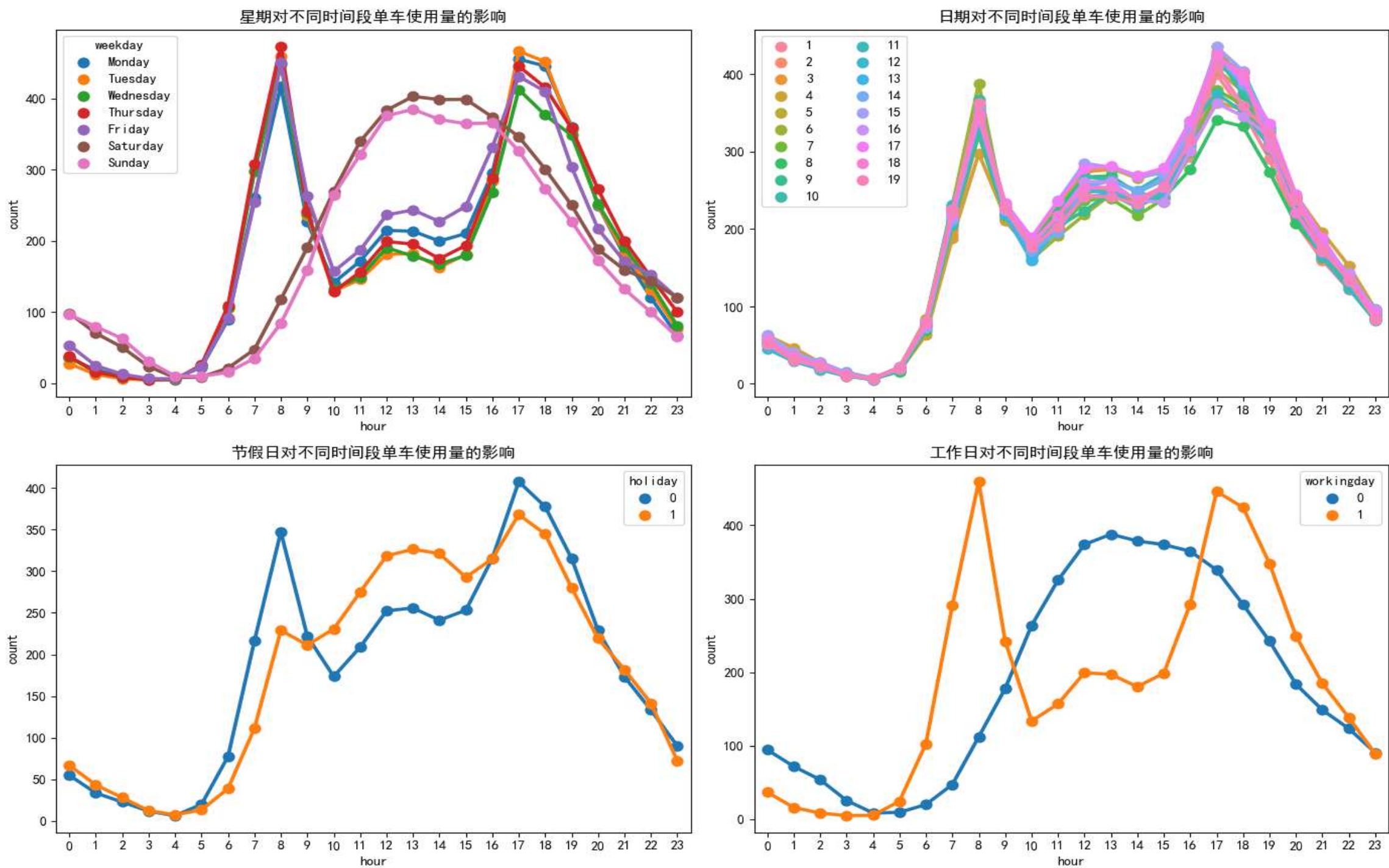


Figure 3: Line Chart



Data Visualization Plot

- Problem Definition test
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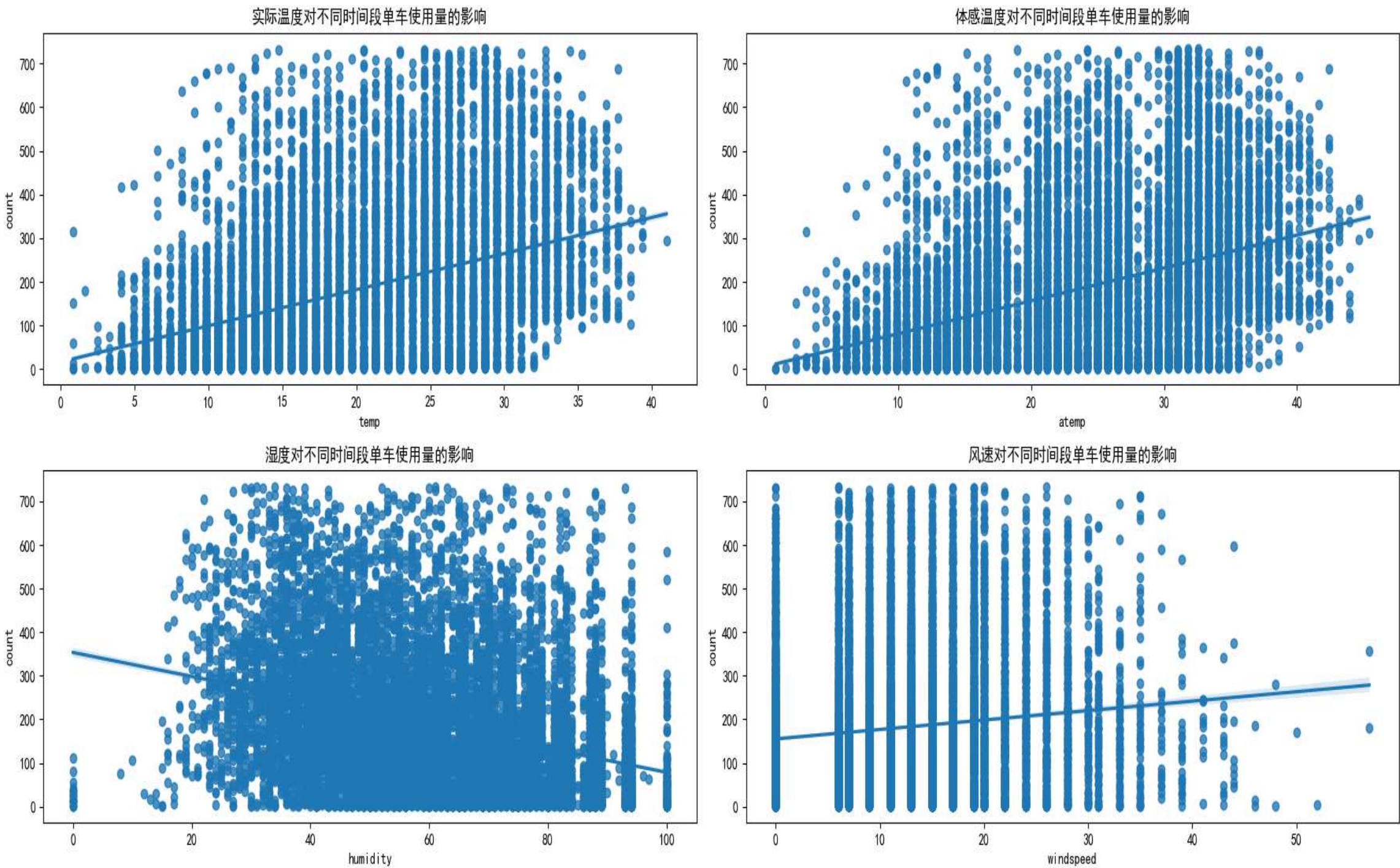


Figure 4: Scatter Plot



Data Visualization Plot

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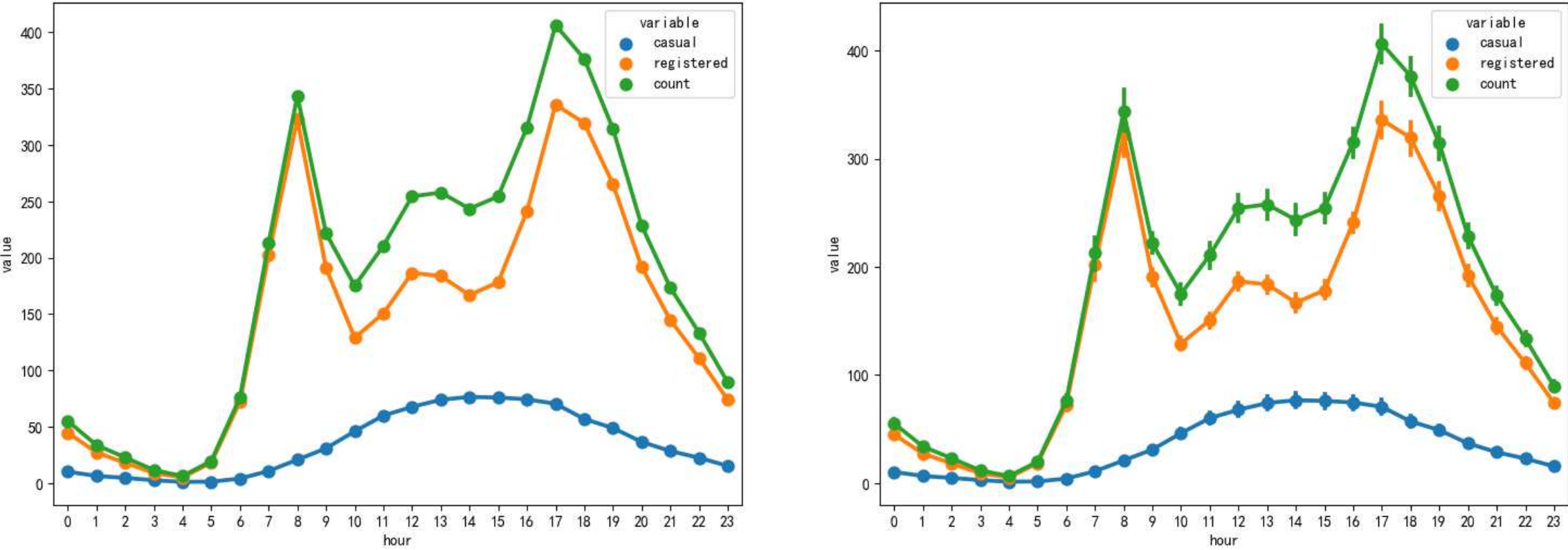


Figure 5: Line Chart



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Knowledge Discovery



Variable Relationship Discovery

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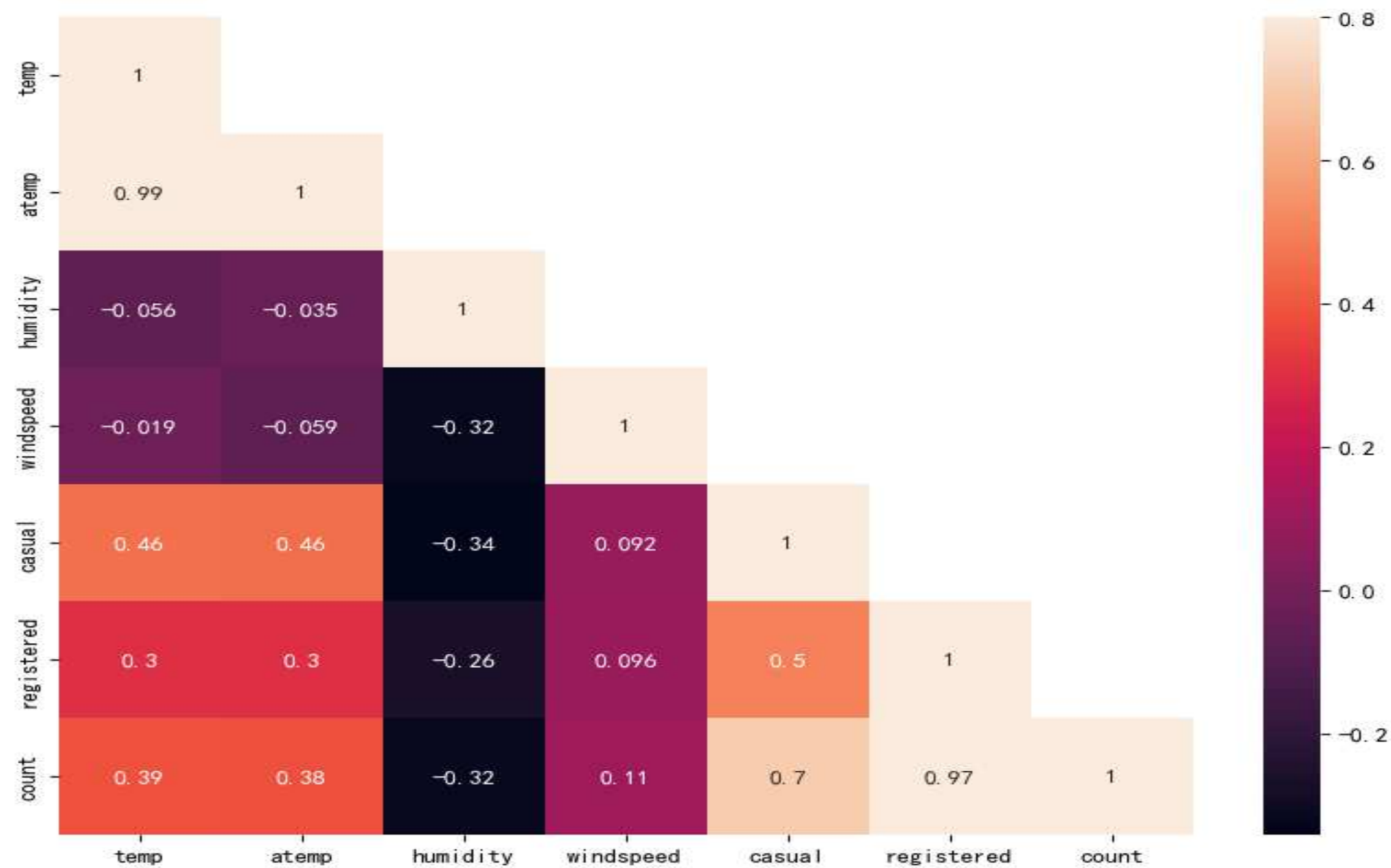


Figure 6: Hot Map



Target Variable Analysis

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- Target Variable Analysis**
- Fill In Zero Values
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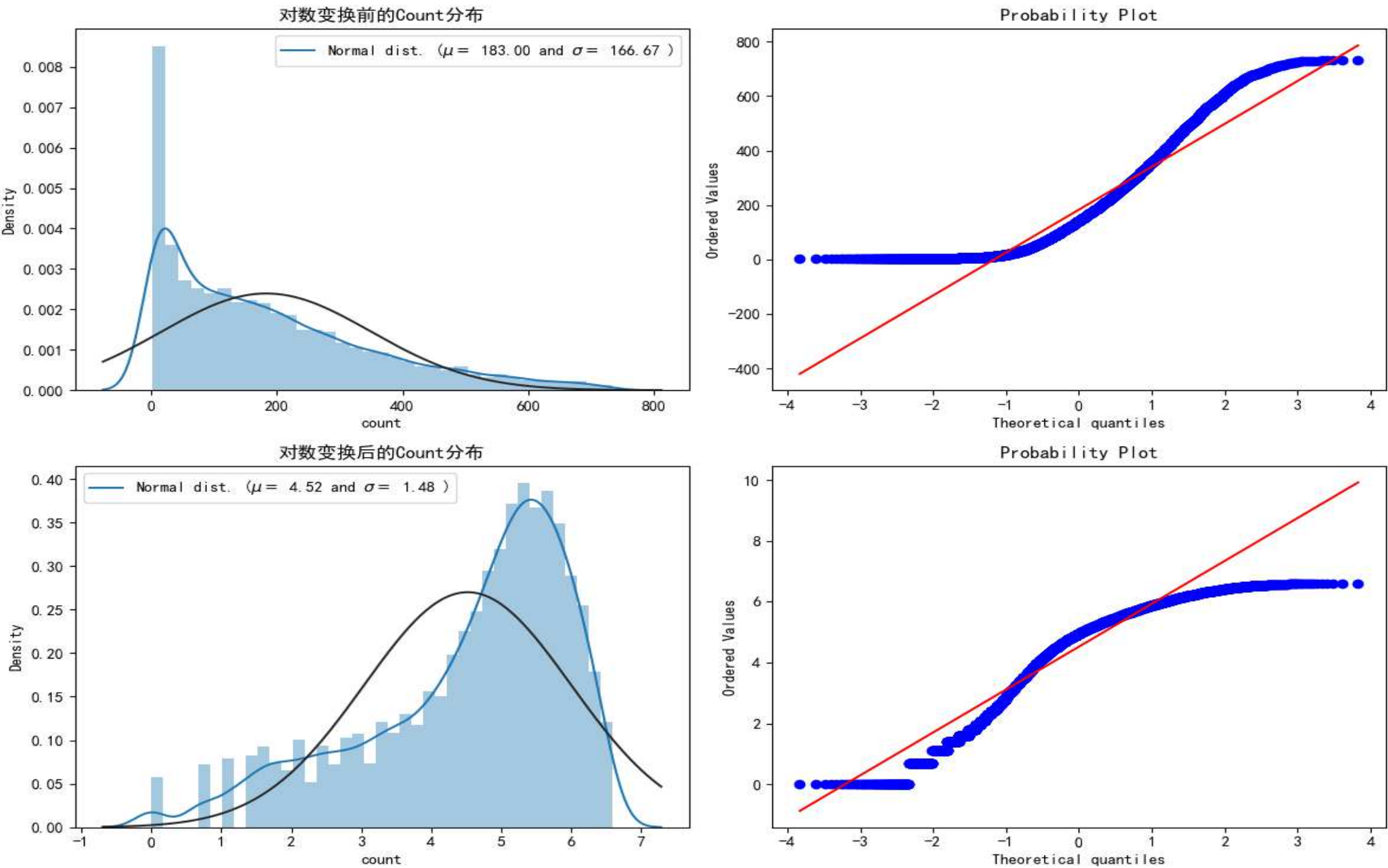


Figure 7: Variable Conversions



Fill In Zero Values

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The random forest model will be used to fill the zero values in the windspeed feature.

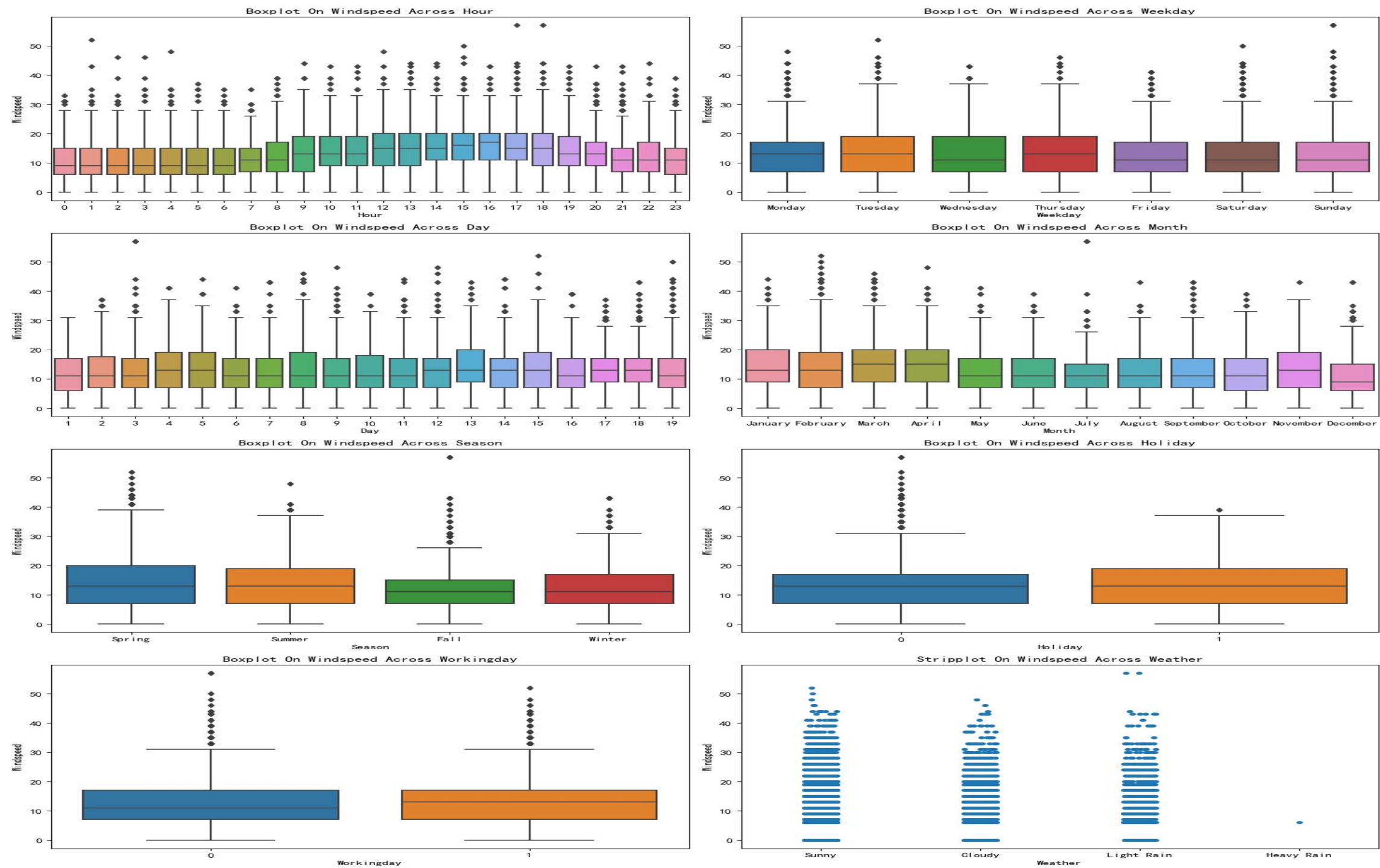


Figure 8: Relationship Between Features and Windspeed



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Summary of RMSLE scores for the 16 models

	Model	RMSLE
15	LightGBM	0.316161
11	RandomForestRegressor	0.375379
10	BaggingRegressor	0.394187
14	XGBoost	0.422559
13	GBRT	0.435759
8	DecisionTreeRegressor	0.523695
9	ExtraTreeRegressor	0.554145
12	AdaBoostRegressor	0.697286
4	KernelRidge Regression	0.813210
7	KNN	0.864965
6	SVR	1.045943
5	ElasticNet Regression	1.053736
3	Ridge Regression	1.053749
2	Lasso Regression	1.054156
0	Linear Regression	1.054414
1	Logistic Regression	1.127804

Figure 9: RMSLE Scores



Model Fusion Stacking

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RMSLE For Stacking: 0.3144



Final prediction result

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Result

The best two models Stacking and LightGBM are weighted and the final prediction is saved.

$$\text{ensemble} = \text{stacking_pred} * 0.60 + \text{lgb_pred} * 0.40$$