# The Models of London Bike Sharing Prediction

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## **Authors**

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Grainger College of Engineering, University of Illinois at Urbana-Champaign

#### Anye Wang

Grainger College of Engineering, University of Illinois at Urbana-Champaign, Civil Engineering - Construction Management

#### • Jane Roe

D XXXX-XXXX-XXXX • p janeroe

Department of Something, University of Whatever; Department of Whatever, University of Something

#### **Abstract**

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### Introduction

**Bold text** 

Semi-bold text

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Italic text

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#### Strikethrough

- 1. Ordered list item
- 2. Ordered list item
  - a. Sub-item
  - b. Sub-item
    - i. Sub-sub-item
- 3. Ordered list item
  - a. Sub-item
- · List item
- List item
- · List item

subscript: H<sub>2</sub>O is a liquid

superscript: 2<sup>10</sup> is 1024.

unicode superscripts 0123456789

unicode subscripts 0123456789

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Putting each sentence on its own line has numerous benefits with regard to <a href="editing">editing</a> and <a href="editing">version</a> control.

Line break without starting a new paragraph by putting two spaces at end of line.

**Heading 3** 

**Heading 4** 

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**Heading 6** 



Horizontal rule:

Heading 2's are recommended for broad sections such as Abstract, Methods, Conclusion, etc.

Heading 3's and Heading 4's are recommended for sub-sections.

#### Links

Bare URL link: <a href="https://manubot.org">https://manubot.org</a>

<u>Long link with lots of words and stuff and junk and bleep and blah and stuff and other stuff and more stuff yeah</u>

Link with text

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Link by reference

### **Citations**

Citation by DOI [1].

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## Referencing figures, tables, equations

Figure 21

Figure 22

Figure 23

Figure 24

```
Table <u>16</u>
Equation <u>11</u>
```

Equation 12

## **Quotes and code**

Quoted text

Quoted block of text

Two roads diverged in a wood, and I—I took the one less traveled by, And that has made all the difference.

Code in the middle of normal text, aka inline code.

Code block with Python syntax highlighting:

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        svyazyvanie-insulyatornyh-belkov-vtransfetsirovannyh-geneticheskih-
        konstruktsiyah"
```

Code block with no syntax highlighting:

```
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```

## **Figures**



**Figure 1:** A square image at actual size and with a bottom caption. Loaded from the latest version of image on GitHub.



**Figure 2:** An image too wide to fit within page at full size. Loaded from a specific (hashed) version of the image on GitHub.



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## **Tables**

**Table 1:** A table with a top caption and specified relative column widths.

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Table 3: A table with merged cells using the attributes plugin.

	Colors		
Size	Text Color	Background Color	
big	blue	orange	
small	black	white	

## **Equations**

A LaTeX equation:

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2} \tag{1}$$

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$$x = a + b + c + d + e + f + g + h + i + j + k + l + m + n + o + p + q + r + s + t + u + v + w + x + y + z + 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9$$
(2)

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### **Literature Review**

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## **Figures**



**Figure 5:** A square image at actual size and with a bottom caption. Loaded from the latest version of image on GitHub.



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Table 6: A table with merged cells using the attributes plugin.

	Colors		
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## **Equations**

A LaTeX equation:

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2} \tag{3}$$

An equation too long to fit within page:

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$$(4)$$

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```

Code block with no syntax highlighting:

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## **Figures**



**Figure 9:** A square image at actual size and with a bottom caption. Loaded from the latest version of image on GitHub.



**Figure 10: An image too wide to fit within page at full size.** Loaded from a specific (hashed) version of the image on GitHub.



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## **Tables**

**Table 7:** A table with a top caption and specified relative column widths.

Bowling Scores	Jane	John	Alice	Bob
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**Table 8:** A table too wide to fit within page.

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Table 9: A table with merged cells using the attributes plugin.

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## **Equations**

A LaTeX equation:

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2} \tag{5}$$

An equation too long to fit within page:

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## The Models to Predict the Amount of Bike Sharing

Based on the exploratory data analysis, regular neural network is used to figure out the project.

Neural network is a model that optimize the parameters through learning process to recognize hidden relationships between different data.

Because of the low correlation between given factors and previous related studies of other researchers, regular neural network probably is the most appropriate model to solve the project. There are 4 steps to build and train neural network, including selecting features, data preprocessing, designing layers and parameters, determining training methods. Dana's code is an example for implementing this algorithms in python.

The architectures and training methods are shown in this slide. We used different features, epochs, hidden layers, units and learning rates in this project. The evaluation of the models' performances are based on the root mean squared error(RMSE) between the test data and predictions.

To evaluate and optimize our models, we analyzed the sensitivity of different parameters.

Units of Layers, Layers, Normalization and Learning Rates are analyzed. To avoid the influence of randomization, the evaluation of the performances is according to the average RMSE of 3 separate training with same initial parameters.

The architectures of neural network and main parameters in training methods of sensitivity analysis are shown in fig.X.

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## **Experiments of the Prediction Models**

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Semi-bold text

Centered text

Right-aligned text

Italic text

Combined italics and bold

#### Strikethrough

- 1. Ordered list item
- 2. Ordered list item
  - a. Sub-item
  - b. Sub-item
    - i. Sub-sub-item
- 3. Ordered list item
  - a. Sub-item
- List item
- List item
- · List item

subscript: H<sub>2</sub>O is a liquid

superscript: 2<sup>10</sup> is 1024.

#### unicode superscripts 0123456789

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A long paragraph of text. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

Putting each sentence on its own line has numerous benefits with regard to <u>editing</u> and <u>version</u> control.

Line break without starting a new paragraph by putting two spaces at end of line.

**Heading 3** 

**Heading 4** 

**Heading 5** 

**Heading 6** 



Horizontal rule:

Heading 3's and Heading 4's are recommended for sub-sections.

## Links

Bare URL link: <a href="https://manubot.org">https://manubot.org</a>

<u>Long link with lots of words and stuff and junk and bleep and blah and stuff and other stuff and more stuff yeah</u>

Link with text

Link with hover text

Link by reference

## **Citations**

Citation by DOI [1].

Citation by PubMed Central ID [2].

Citation by PubMed ID [3].

Citation by Wikidata ID [4].

Citation by ISBN [5].

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Citation by alias [7].

Multiple citations can be put inside the same set of brackets [1,5,7]. Manubot plugins provide easier, more convenient visualization of and navigation between citations [2,3,7,8].

Citation tags (i.e. aliases) can be defined in their own paragraphs using Markdown's reference link syntax:

## Referencing figures, tables, equations

Figure 21

Figure 22

Figure 23

Figure 24

```
Table <u>16</u>
Equation <u>11</u>
```

Equation 12

## **Quotes and code**

Quoted text

Quoted block of text

Two roads diverged in a wood, and I—I took the one less traveled by, And that has made all the difference.

Code in the middle of normal text, aka inline code.

Code block with Python syntax highlighting:

```
from manubot.cite.doi import expand_short_doi

def test_expand_short_doi():
    doi = expand_short_doi("10/c3bp")
    # a string too long to fit within page:
    assert doi == "10.25313/2524-2695-2018-3-vliyanie-enhansera-copia-i-
        insulyatora-gypsy-na-sintez-ernk-modifikatsii-hromatina-i-
        svyazyvanie-insulyatornyh-belkov-vtransfetsirovannyh-geneticheskih-
        konstruktsiyah"
```

Code block with no syntax highlighting:

```
Exporting HTML manuscript
Exporting DOCX manuscript
Exporting PDF manuscript
```

## **Figures**



**Figure 17:** A square image at actual size and with a bottom caption. Loaded from the latest version of image on GitHub.



**Figure 18: An image too wide to fit within page at full size.** Loaded from a specific (hashed) version of the image on GitHub.



Figure 19: A tall image with a specified height. Loaded from a specific (hashed) version of the image on GitHub.



**Figure 20:** A vector .svg image loaded from GitHub. The parameter sanitize=true is necessary to properly load SVGs hosted via GitHub URLs. White background specified to serve as a backdrop for transparent sections of the image.

## **Tables**

**Table 13:** A table with a top caption and specified relative column widths.

Bowling Scores	Jane	John	Alice	Bob
Game 1	150	187	210	105
Game 2	98	202	197	102
Game 3	123	180	238	134

**Table 14:** A table too wide to fit within page.

	Digits 1-33	Digits 34-66	Digits 67-99	Ref.
pi	3.14159265358979323 846264338327950	28841971693993751 0582097494459230	78164062862089986 2803482534211706	piday.org
е	2.71828182845904523 536028747135266	24977572470936999 5957496696762772	40766303535475945 7138217852516642	nasa.gov

Table 15: A table with merged cells using the attributes plugin.

	Colors	
Size	Text Color	Background Color
big	blue	orange
small	black	white

## **Equations**

A LaTeX equation:

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2} \tag{9}$$

An equation too long to fit within page:

$$x = a + b + c + d + e + f + g + h + i + j + k + l + m + n + o + p + q + r + s + t + u + v + w + x + y + z + 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9$$

$$(10)$$

## **Special**

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Manubot Manubo

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Using the **Font Awesome** icon set:

## **Light Grey Banner**

useful for general information - manubot.org

#### **6** Blue Banner

useful for important information - manubot.org

## **\Omega** Light Red Banner

useful for warnings - manubot.org

This manuscript is a template (aka "rootstock") for <u>Manubot</u>, a tool for writing scholarly manuscripts. Use this template as a starting point for your manuscript.

The rest of this document is a full list of formatting elements/features supported by Manubot. Compare the input (.md files in the /content directory) to the output you see below.

## **Experiments of the Prediction Models**

**Bold text** 

Semi-bold text

Centered text

Right-aligned text

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$$(12)$$

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**♦ Light Red Banner** useful for *warnings* - <u>manubot.org</u>

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DOI: <u>10.1371/journal.pcbi.1007128</u> · PMID: <u>31233491</u> · PMCID: <u>PMC6611653</u>