Delivery Eligibility Using Geospatial Data

Determining Same-Day Delivery in Massachusetts, USA

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ABSTRACT

This project investigates same-day delivery eligibility for addresses within Massachusetts, U.S., leveraging geospatial data from OpenStreetMap and MassGIS. The study quantifies the relationship between distance, geographic constraints, and delivery feasibility by analyzing delivery zones defined through polygons and radius-based boundaries. Predictive regression models and efficient geocoding and visualization techniques are employed to ensure scalability and clarity.

KEYWORDS

Geospatial Analysis, Delivery Zones, Same-Day Shipping, Geocoding, Massachusetts

1 Introduction

Same-day delivery has emerged as a key differentiator for e-commerce platforms, requiring precise geospatial analysis to determine delivery feasibility. In Massachusetts, geographic boundaries such as rivers, highways, and urban centers add complexity to defining and analyzing delivery zones. This project explores how delivery zones can be mapped and analyzed to ensure efficient decision-making for same-day eligibility. The objectives include:

* Defining delivery zones for Massachusetts using polygon-based and radius-based methods.
* Evaluating the impact of distance and geographic restrictions on delivery feasibility.
* Developing efficient, scalable methods for analyzing multiple addresses.
* By focusing on Massachusetts, this project addresses a specific U.S. context, providing actionable insights for delivery network optimization.

This project addresses a specific U.S. context by focusing on Massachusetts, providing actionable insights for delivery network optimization.

2 Data

In this part, you should introduce your datasets.

2.1 Source of dataset

* Where did you download it? Is it a credible source? When were the datasets generated? How were the datasets generated by the creator? If you create the datasets, how did you generate it?
* Example: xxxx

2.2 Characters of the datasets

* What’s the format and size of the datasets? What parameters/columns/rows/character and their units are included in this dataset. Use a table to explain this is recommended. Did you clean the data or convert any unit in the dataset? If so, what’s the formula/rule did you apply? Did you combine any datasets? If so, how do you combine them? Did you create any new category for analysis in the datasets? If so, what and how do you create?

3 Methodology

* In this part, you should give an introduction to the methods/model. First, what’s the method/model. What’s the assumption of this method/model. What’s the advantage/disadvantage of this method/model. Why did you choose it. What Python module or function do you apply to apply this method/model. Any optional input/extra work did you adjust to make the results better. If you have multiple methods, feel free to use subsection 3.1, 3.2, 3.3, … to separate them.

3.1 Heading Level 2

3.2 Heading Level 2

* …
* Example format: The updated template, user manuals, samples, and required fonts, all are available at the URL <https://www.acm.org/publications/proceedings-template>. It contains said information for all three versions of MS Word (Windows and 2 versions of Mac). There are also separate links to the user guide, which can be referred to by the user. This URL also contains some useful video links, which describe how to add the template, structure the paper, and generate the layout, in different clips. **Display Formula with Number**

 (1)

* **Continuation part of Paragraph Text** The user must style this paragraph in **ParaContinue** style, which follows immediately after the **DisplayFormula** (numbered equation). The **DisplayFormula** style is applied only in case of a numbered equation. A numbered equation always has a number to its right. Insert paragraph text here. **Display Formula without Number**



* The **DisplayFormulaUnnum** style is applied only in case of an unnumbered equation. An unnumbered display equation never contains an equation number to its right, and this unique property distinguishes it from a numbered equation.



Figure 1: Figure Caption and Image above the caption [In draft mode, Image will not appear on the screen]

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4 Results

* In this part, you need to select a reasonable way to deliver the result of your topic. For example, equation or numerical results, or visualization of your result. You also need to provide a clear explanation of all results and how to understand the results. If there exist any unexpected results, please explain why or possible cause of this special result. You can use subsection 4.1, 4.2, … to separate your results.

4.1 Heading Level 2

* Example format: In the below paragraph, it is explained how alt-txt value is placed in **MS Word 2010**. To add alternative text to a picture in Word 2010, follow these steps:

1. In a Word 2010 document, insert a picture.
2. Right click on the inserted picture and select the **Format Picture** option.
3. Select the **Alt Txt** option from the left-side panel options.
4. In the "Title:" and "Description:" text boxes, type the text you want to represent the picture, and then click "Close".

* Below are steps to place alt-txt value in **MS Word 2013/2016**. To add alternative text to a picture in Word 2013/2016, follow these steps:

1. In a Word 2013/2016 document, insert a picture.
2. Right click on the inserted picture and select the **Format Picture** option.
3. In the settings at the right side of the window, click on the "Layout & Properties" icon (3rd option).
4. Expand **Alt Txt** option.
5. In the "Title:" and "Description:" text boxes, type the text you want to represent the picture, and then click "Close".

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* *1.1.1.1 Heading Level 4.*Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here. Insert paragraph text here.

5 Discussion

* Every method/project has its shortage or weakness. Please discuss the unsatisfied results in your project. And discuss the feasible suggestions of future work to revise/improve your result.

6 Conclusion

* In this part, you should summarize your project. What important results did you find for your topic and what’s the effect of this result on the real-world?

ACKNOWLEDGMENTS

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REFERENCES

Use the following ACM Reference format for your citation

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