



Student: Jieming Feng, SCM 2021
Student: Mauricio Moreno, SCM 2021
Advisor: Ozden Tozanli
Advisor: Pascal Wolff
Sponsor: Warren Huang

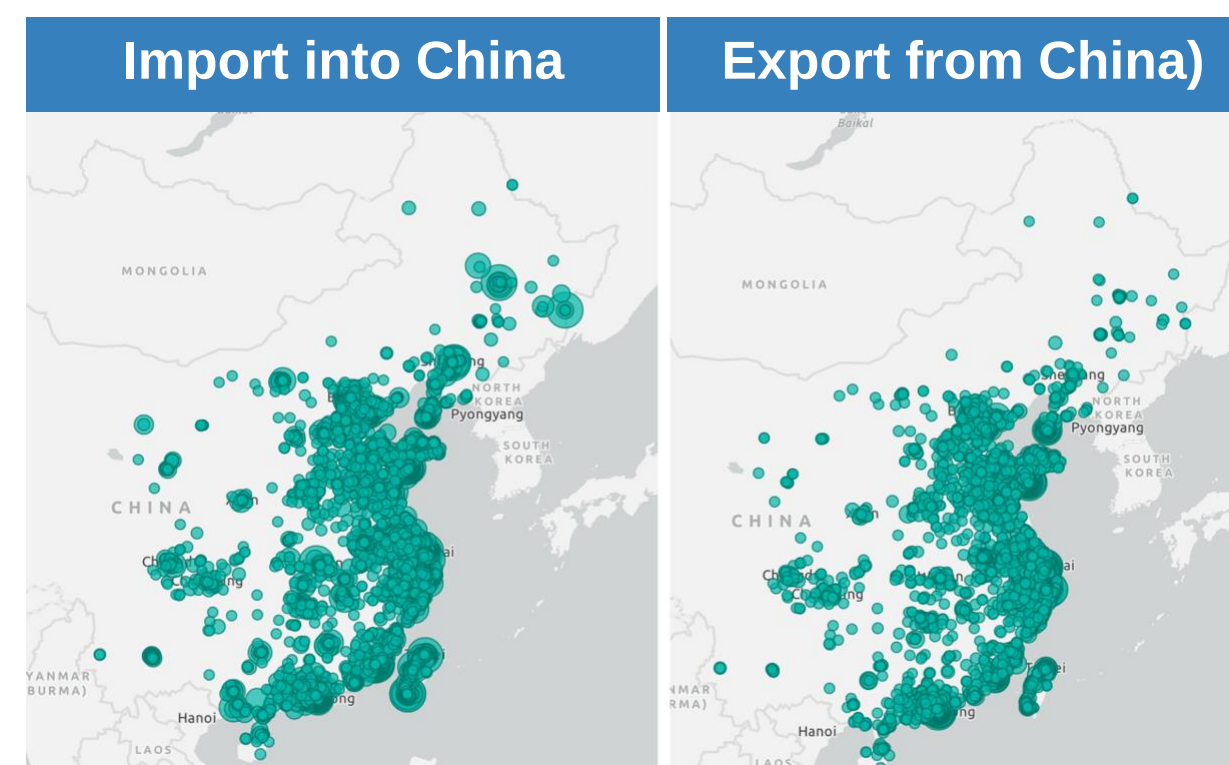
Developing a digital solution for container triangulation in China

May 2021 Poster Session

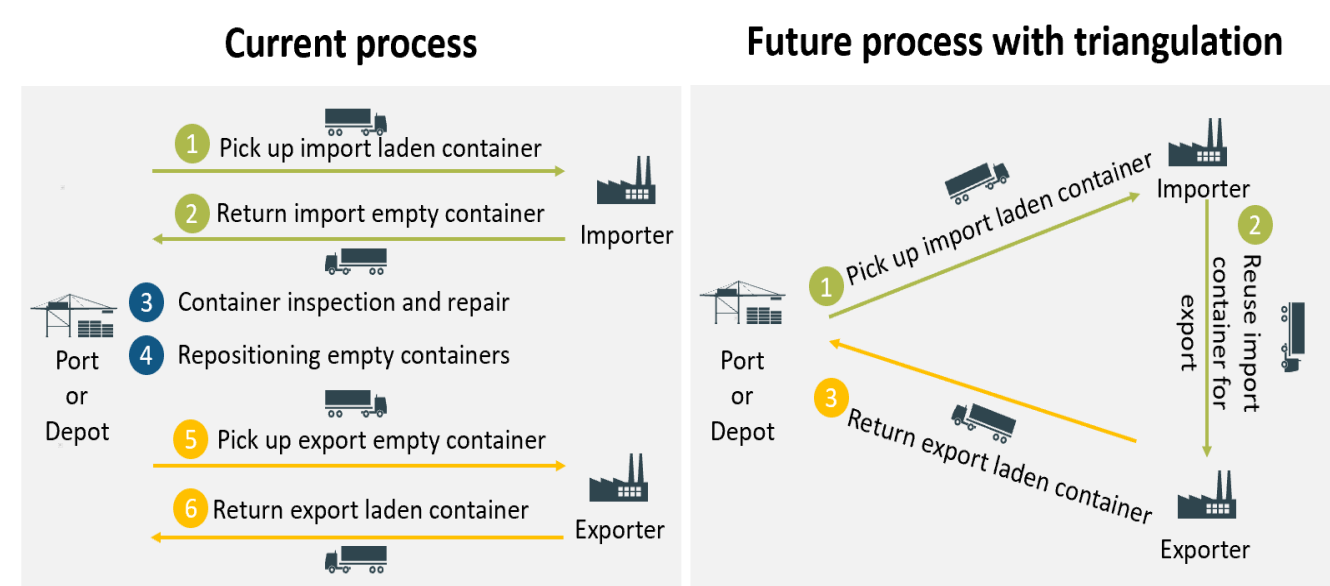
Motivation / Background

- > Total **import** into China was **14.8 million** TEUs and **export** from China was **47.5 million** TEUs in 2019
- > China government has committed to limit the greenhouse gas emission by 2030 and become **Carbon Neutral** by 2060
- > Maersk is one of the market leaders driving digital transformation, and is committed to **Carbon Zero** by 2050

Maersk is an integrated container logistics company with a dedicated team of over 80,000 employees, operating in 130 countries and representing 20% of the global container shipping market share.



Key Question / Hypothesis

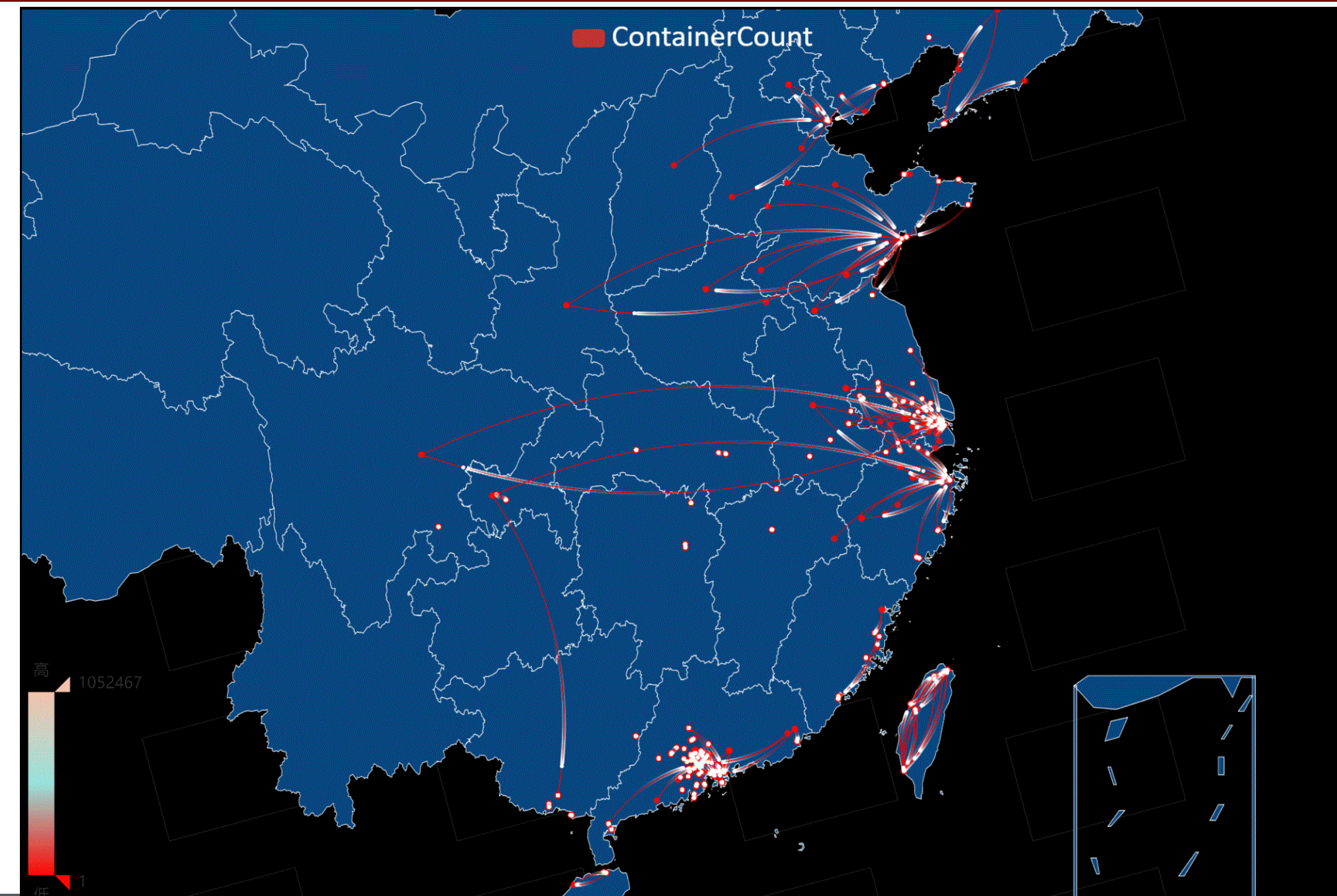


How to automate and optimize container triangulation in China to improve logistics efficiency and reduce cost and carbon emission?

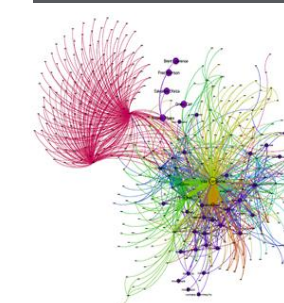
Relevant Literature

Zhang, R., Yun, W. Y., & Kopfer, H. (2010). Heuristic-based truck scheduling for inland container transportation. OR Spectrum, 32(3), 787–808. <https://doi.org/10.1007/s00291-010-0193-4>

Kuzmicz, K. A., & Pesch, E. (2019). Approaches to empty container repositioning problems in the context of Eurasian intermodal transportation. Omega, 85, 194–213. <https://doi.org/10.1016/j.omega.2018.06.004>



The Problem



Fragmented market and lack of accurate location data for container delivery

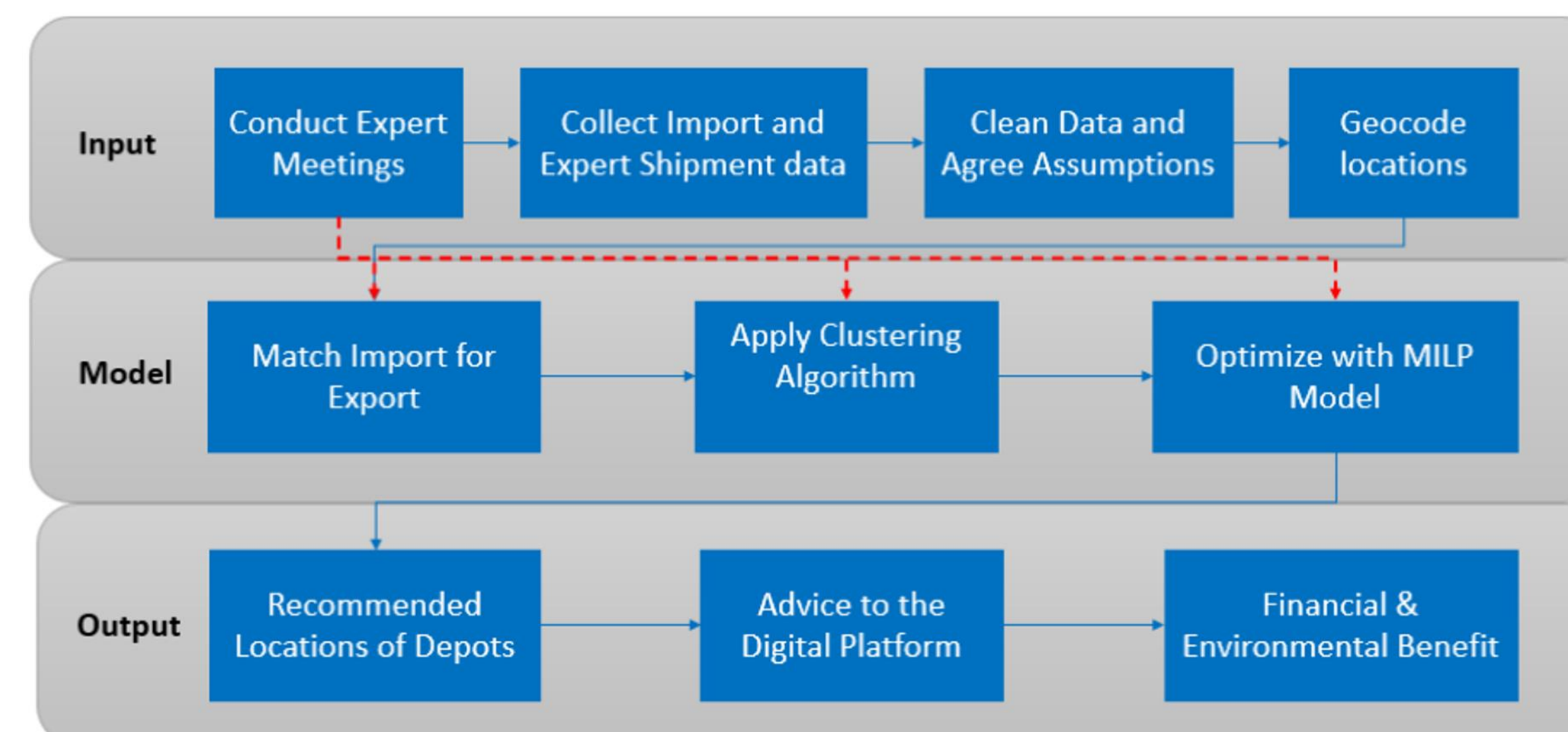


What **machine learning and optimization models** can be used to automate and accelerate?



Geocode up to 21k customers locations to explore the optimal transport route

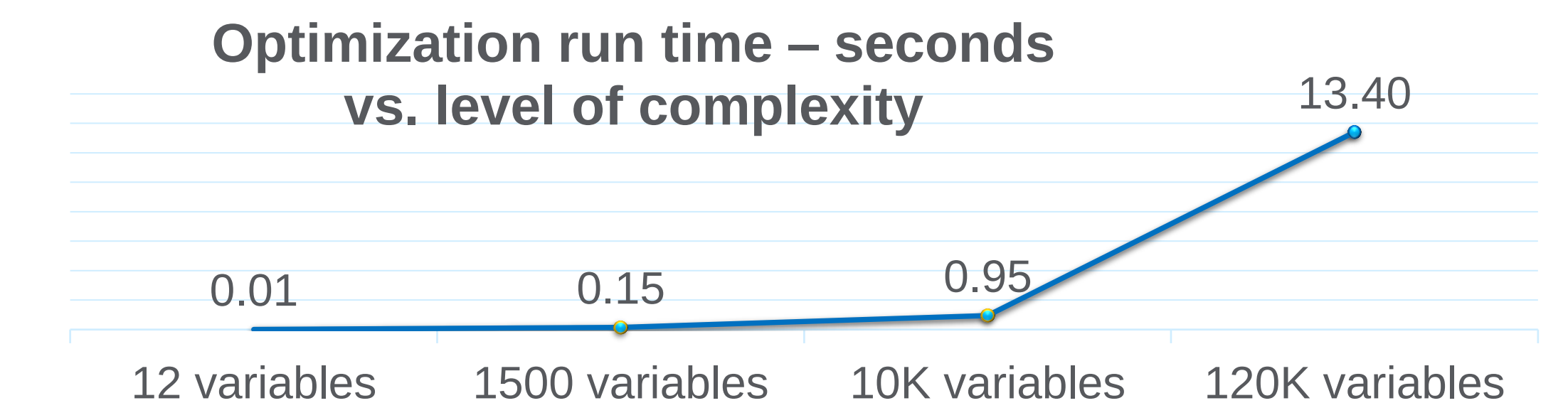
Methodology



The Results

With our clustering algorithm and MILP model, we quantified **11 ~ 14%** saving with optimization run time in seconds

Scenarios	Cost saving	Time saving	CO2 reduction
Max 12 hours per route	11%	8%	8%
Max 460 KMs per route	13%	10%	10%
With above two constraints	14%	11%	11%



Conclusions

- Integrate the clustering and MILP model into the company digital platform enabling automation with real time optimization
- Set mandatory requirements for trucking companies to capture real location data for containers, and validate the real locations with importers in key clusters
- Report the benefit of cost saving, time and CO2 reduction on the platform to attract more adopters
- Set a dedicated team to proactively promote the digital solution for container triangulation
- Collaboration and coordination among stakeholders is critical to the acceleration of the solution in the industry

Jieming Feng



Mauricio Moreno

