

SMART INDIA HACKATHON 2024



OPTIMAL SHIP ROUTING ALGORITHM

PS ID	SIH1658
PS TITLE	Development Of A Versatile And Fast Algorithm For The Optimal Ship Routing.
THEME	Transportation & Logistics
PS Category	Software
Organization	Ministry of Earth Sciences
Team ID	153
Team Name	JALAYAAN



JALAYAAN

PREVIOUS **MISTAKES** CURRENT **SUCCESSSES!**

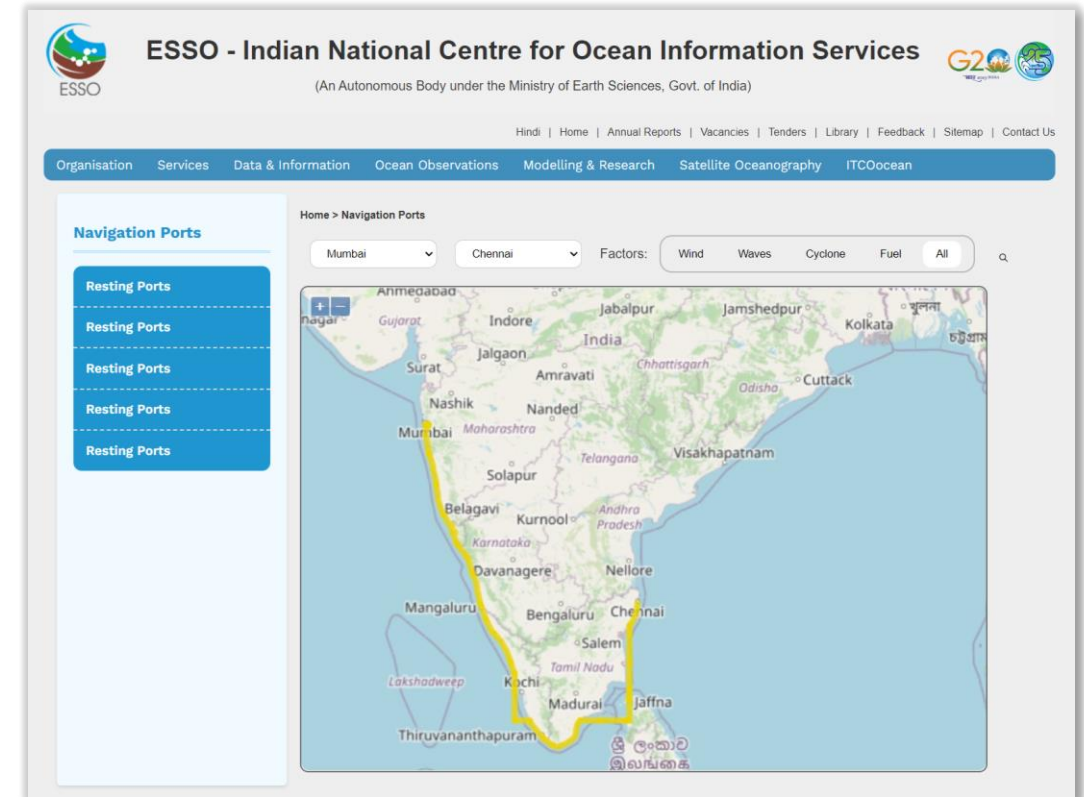
WHAT WENT WRONG PREVIOUSLY?

- 1) No **optimal real-time** navigation.
- 2) Only focuses on one parameter **e.g. Fuel**.
- 3) No technology specific to **Indian Ocean**.

WHAT DO WE OFFER?

- 1) Optimal and **FAST real-time** navigation.
- 2) Focusing on multiple factors i.e. **Fuel, safety, time...**
- 3) Computations specific to **Indian Ocean**.
- 4) Scope to add others parameters in future.
- 5) **A web-page which does all of this!**
- 6) **Dynamic search** with multicriteria facilities.
- 7) Integration to the **INCOIS website** to **cut down multiple costs**.

BUT HOW??



Integration of web-pages in the INCOIS
website

AN ALGORITHM FOR EVERYTHING!

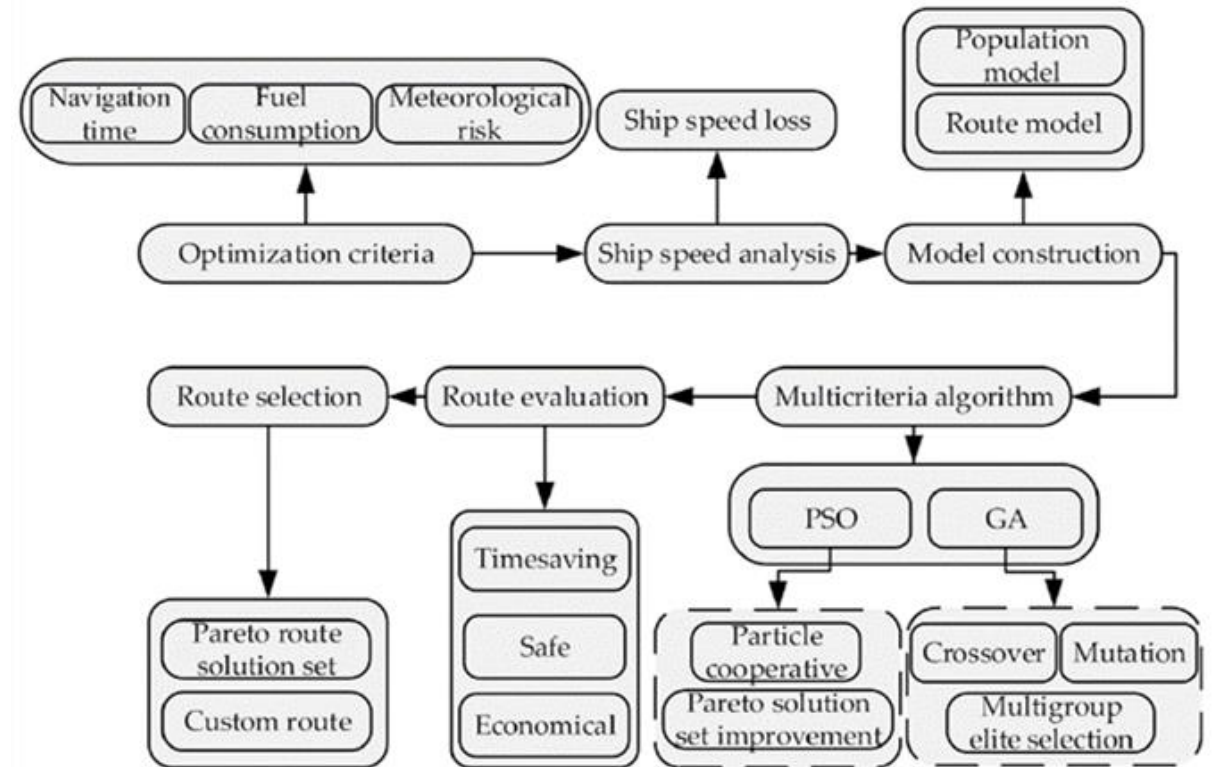
❑ Particle Swarm Optimization and Genetic Algorithm for real-time navigation. ^[1]

- 1) Least **Fuel consumption**
- 2) Travel time & passenger comfort.

❑ Our Modifications

- 1) **Multi-criteria** Algorithm with scope to add other parameters. ^[2]
- 2) Reducing **Run-Time Complexity.** ^[3]
- 3) **Indian specific** with the ability of **dynamic searches.**

BUT IS IT REALLY FEASIBLE?



- ❑ Python - Easy to code and edit, open-source, **low cost**.
- ❑ **No additional software** required, cutting off costs by multiple factors.
- ❑ **Cost reduction by optimizing fuel consumption.**

RISKS AND **SOLUTIONS**

- ❑ **High Run-Time Complexity:** Clubbing factors **e.g. wind speed, wave heights, etc.** into bins and applying **Memoization** will certainly solve the issue!
- ❑ **Data Leakage:** Using different Data Management techniques to ensure a secure and safe operation.

COST ↓
EFFICIENCY ↑

BUT WHY DO WE NEED THIS?

- ☐ **SAVES LIFE!**
- ☐ **Specific to the Indian Ocean!!**
- ☐ **Low Cost** of the Product.
- ☐ **Carbon Emission Reduction.** ^[4]
- ☐ Boost to **Local Economy** and **Employment**.
- ☐ Possibility of out-sourcing the technology for **monetary gain**.
- ☐ **Target Audience:** Anyone with the government authorization. **E.g. Cargo Ships, Passenger ships, Coast Guard rescue boats, Indian Navy**, etc.



- 1 Zhao, Wei, Yan Wang, Zhanshuo Zhang, and Hongbo Wang. "Multicriteria ship route planning method based on improved particle swarm optimization–genetic algorithm." *Journal of Marine Science and Engineering* 9, no. 4 (2021): 357.
- 2 Sen, Debabrata, and Chinmaya P. Padhy. "An approach for development of a ship routing algorithm for application in the North Indian Ocean region." *Applied Ocean Research* 50 (2015): 173-191.
- 3 Wen, Xin, Qiong Chen, Yu-Qi Yin, Yui-yip Lau, and Maxim A. Dulebenets. "Multi-Objective Optimization for Ship Scheduling with Port Congestion and Environmental Considerations." *Journal of Marine Science and Engineering* 12, no. 1 (2024): 114.
- 4 Andersson, Peter, and Pernilla Ivehammar. "Cost benefit analysis of dynamic route planning at sea." *Transportation Research Procedia* 14 (2016): 193-202.