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Introduction

Artificial intelligence (AI) potential impact on the future of maritime transportation has been extensively discussed in recent years, increased autonomy of the shipping industry is inevitable. This study investigated maritime students' and educators' perception of the impact of AI influence, and explore how to optimize the maritime education and training (MET) curriculum to increase their lifelong career ability.

We investigated the detail of research progress and development direction of the shipping industry in the era of AI, including review the latest developments of computer vision, human-computer interaction, path planning, autonomous decision-making, and control, as shown in figure.

From it, we think students will face more difficult and stressful courses in the future. In the next, we will conduct a survey on students to understand their thinking. Then in the context of smart ships, exploring to design curriculums that can enhance the student's lifelong professional abilities and student can accept.

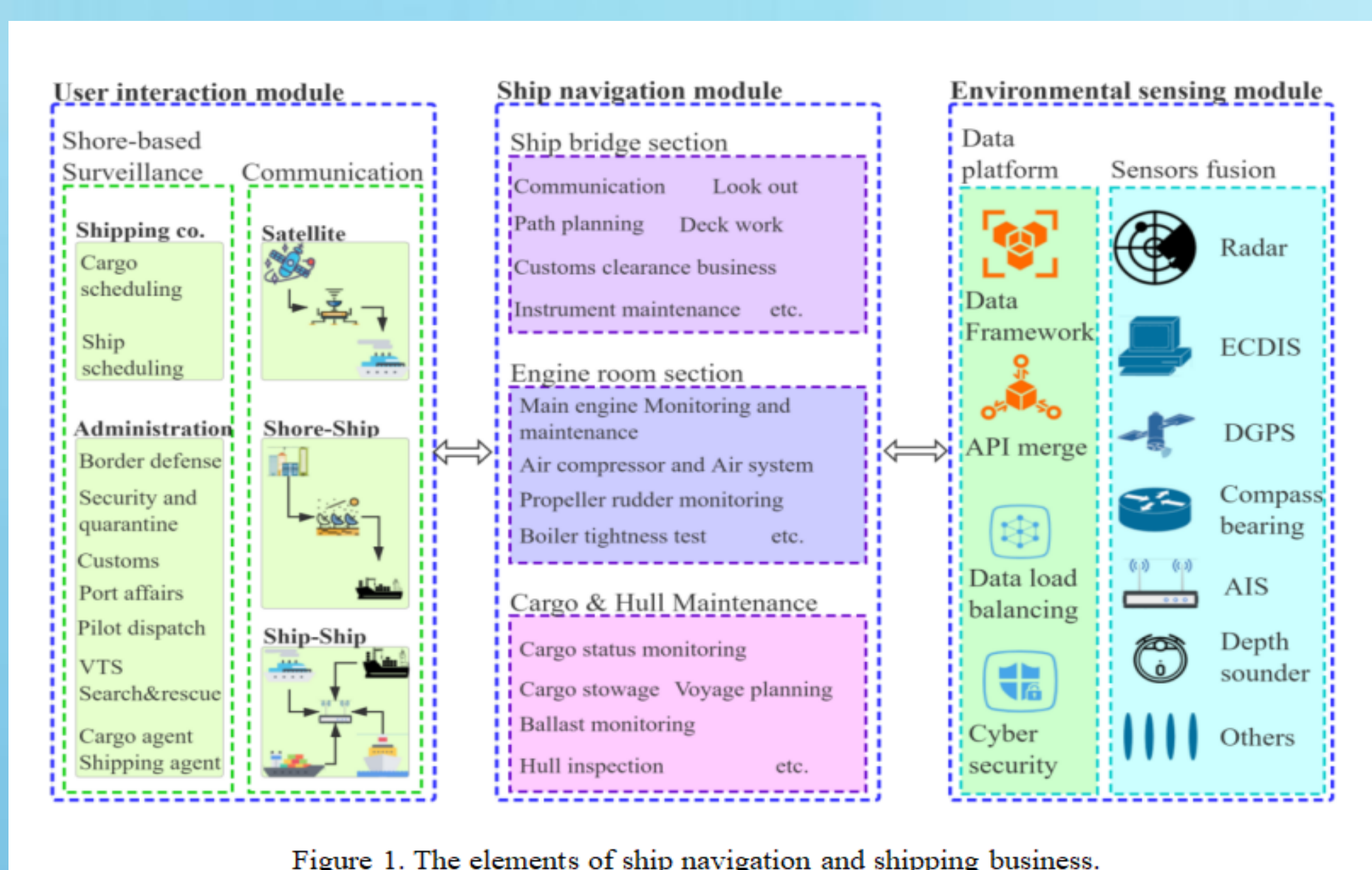


Figure 1. The elements of ship navigation and shipping business.

Data analysis

Among 266 student respondents and 43 educator respondents, we use a fishbone diagram to analyze three factors that might influence maritime students to work onboard: social recognition; salary and company brand. Chi-square test have been used to analyze the differences between these three factors. For the statistical inference of large categorical data, the chi-square test has the advantage of convenient and simple than the T-test.

Title	Options	Professional category			Proportion	χ^2	p
		Major in Marine (Marine Engineering, Navigation Technology)	maritime-related majors	others			
Salary	Very satisfied	10.64%	9.09%	21.82%	15.93%	9.376	0.154
	Fairly satisfied	51.06%	36.36%	60.00%	53.98%		
	Less satisfied	23.40%	36.36%	10.91%	18.58%		
	Dissatisfied	14.89%	18.18%	7.27%	11.50%		

Table 1: The distribution of seafarers' salary satisfaction among the different majors currently involved.

Title	Options	Professional category			Proportion	χ^2	p
		Major in Marine (Marine Engineering, Navigation Technology)	maritime-related majors	others			
Social Recognition	Very Recognized	14.89%	0.00%	30.91%	21.24%	26.294	0.000**
	Basically recognized	31.91%	72.73%	54.55%	46.90%		
	Not very much recognized	51.06%	18.18%	14.55%	30.69%		
	Not Recognized	2.13%	9.09%	0.00%	1.77%		

Table 2: The distribution of seafarers' social recognition among the different majors currently involved.

Title	Options	Professional category			Proportion	χ^2	p
		Major in Marine (Marine Engineering, Navigation Technology)	maritime-related majors	others			
company brand	Salary	65.96%	54.55%	47.27%	55.75%	24.400***	0.007**
	Business Scope	6.38%	0.00%	18.18%	11.50%		
	Promotion Speed	10.64%	18.18%	1.82%	7.08%		
	Promotion Space	12.77%	27.27%	7.27%	11.50%		
	Ship condition	2.13%	0.00%	14.55%	7.96%		
	Other	2.13%	0.00%	10.91%	6.19%		

Table 3: The distribution of seafarers' company brand among the different majors currently involved.

Title	Options	Professional category		Proportion	χ^2	p
		Major in Marine (Marine Engineering, Navigation Technology)	maritime-related majors			
The realization of ocean-going unmanned ships navigation	Must Possible	29.20%	58.41%	2.631	0.854	
	Possible	4.52%	7.96%			
	Impossible	66.28%	33.63%			
Development directions	Uncertain	7.96%	50.44%	9.084	0.059	
	Human involvement	37.17%	12.39%			
	Remote control	12.39%	12.39%			
	Autonomous driving	42.48%	12.39%			
Current difficulties	Unfilled and other	12.38%	19.47%	15.365	0.222	
	International rules	19.47%	19.47%			
	Autonomous decision making	19.47%	19.47%			
	Port construction	5.31%	5.31%			
	Cabin Watch Information Perception	17.70%	25.66%			

Table 5: Kaiser-Meyer-Olkin (KMO) test, effectiveness analysis

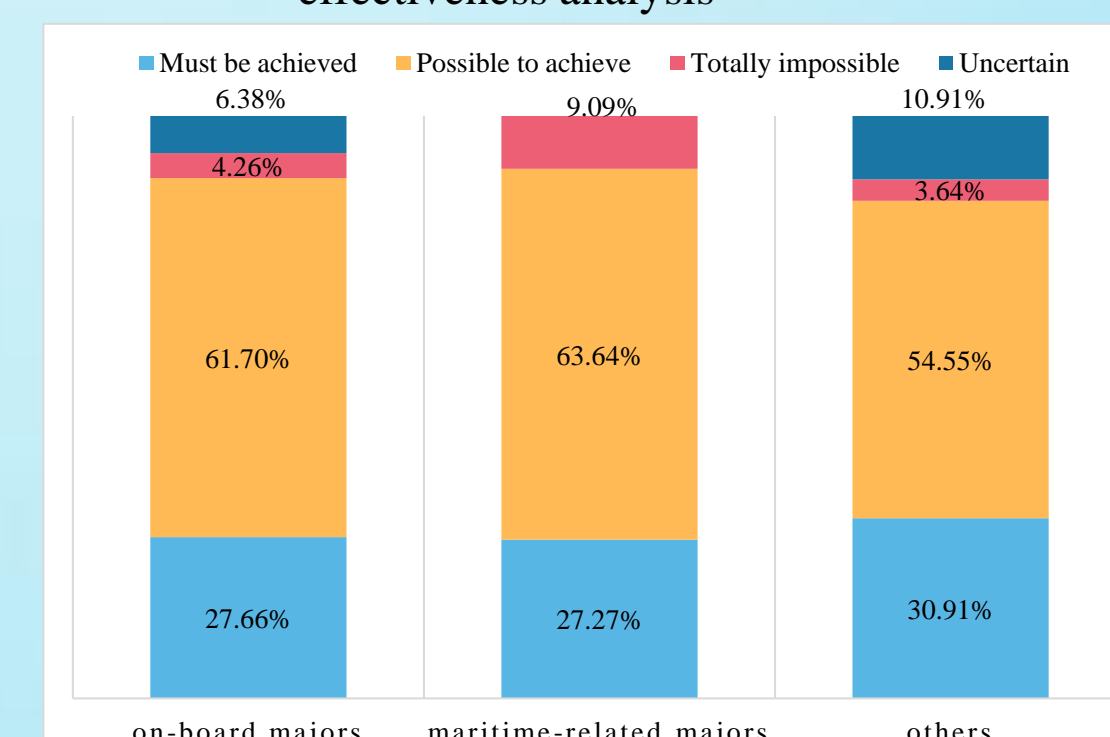


Figure 7. Unmanned ships implementation attitudes from the different majors' students

KMO & Bartlett test	
KMO value	0.773
Bartlett sphericity check	Approximate cardinality: 67.024
	df: 10
	p value: 0

Table 4: Major in Marine's (Marine Engineering, Navigation Technology)views on unmanned ships

	independent variables	Non-independent variables
X1: Course category	0.672	0.455
	-0.79	-0.405
X2: Course difficulty	-0.302	2.175*
	(-0.481)	-1.971
X3: Future development correlation	1.08	0.974
	-1.554	-1.064
Intercept	-1.437	-7.751**
	(-0.976)	(-2.837)
Likelihood ratio test		$\chi^2(6)=16.942, p=0.009$

Table 6: Results of multi-categorical logistic regression analysis.

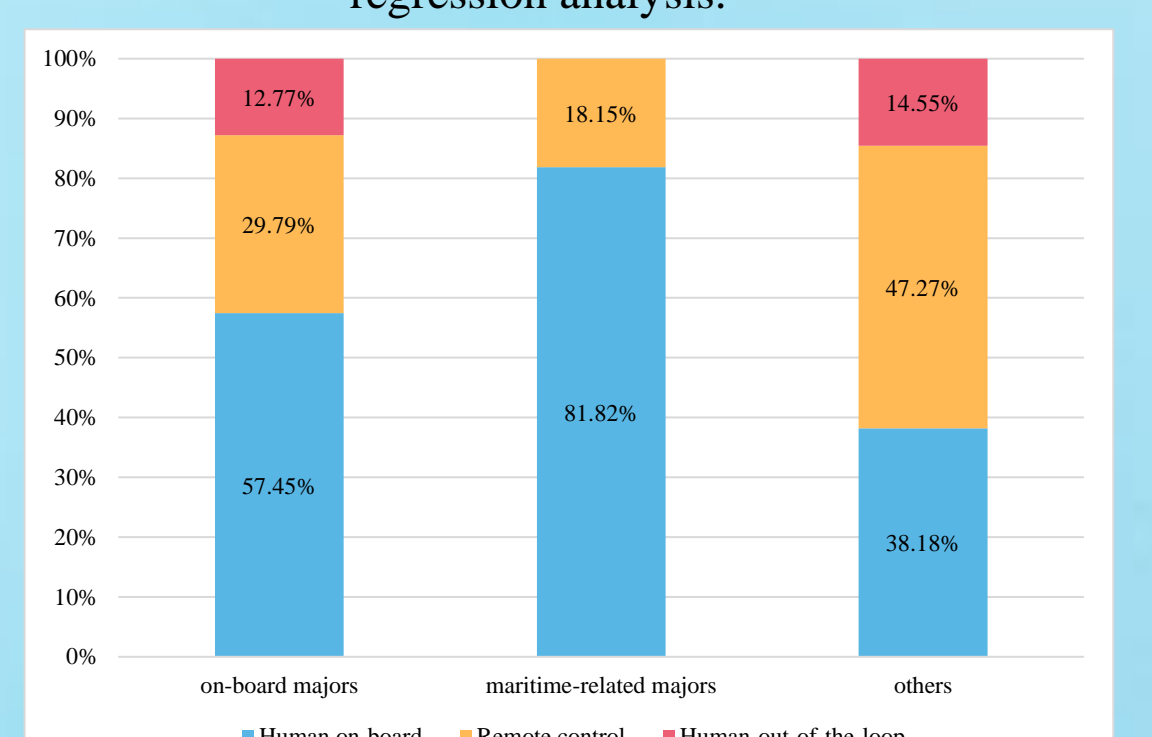


Figure 8. Intelligent shipping industry attitudes from the different majors' students

Conclusion

Through analyzing the interviews and questionnaires, we obtained the following consequences.

- 1) Consensus: the shipping industry will undergo a great change under the influence of AI.
- 2) Interview & investigation: the development of intelligent ships will affect the seafarer occupation, which may decrease in quantity and will increase in required quality.
- 3) MET curriculum: MET courses outdated

Discussion

Curriculum design

- 1) Heightening the frequency for textbook updating to reduce problems caused by textbook lag among the educated.
- 2) Increasing curriculum diversity, adding diversified compulsory and optional courses.
- 3) Sifting out and expurgating courses which are unfit for seafarer training and lagging in smart shipping development to reduce seafarers' pressure.
- 4) Offering more AI-related lectures, popularizing artificial intelligence knowledge, and uploading intelligent transportation public courses.

Career orientation

- 1) Gradually blur the boundaries of disciplines and cultivate integrated talents.
- 2) Update current discipline and incorporate new disciplines, cultivate new types of technical personnel.
- 3) Encourage learning outside of training and cultivate adaptable talents.