Background

- Recently AIS is a key infrastructure to improve the safety.

Marine Traffic Simulator and AIS Simulator are developed for these purpose in Osaka University.

How to evaluate marine safety?

Safety Assessment by Ship Handling Simulator

Panama Canal Gaillard Cut expansion in 1984
CAORF, 1984
The author has engaged in Marine ITS project (FY1999-2004) sponsored by Ministry of Transport (now changed its name as Land, Infrastructure and Transport), Japan.

Marine Traffic Simulator (1)
- Marine Traffic Simulator is a simulation system to reproduce the marine traffic of a given area as natural as possible.
- The system consists of ship generation subsystem, ship navigations subsystem, automatic collision avoidance subsystem and system interface and logging subsystem.

Marine Traffic Simulator (2)
- Ship generation subsystem generates ships from given departing points according to the statistical data, including their attributes such as ship type, length, speed, manoeuvring characteristics, waypoints etc.

Marine Traffic Simulator (3)
- Automatic collision avoidance subsystem is more heuristic human model which can take appropriate navigational decision for collision avoidance.

Marine Traffic Simulator (4)
- System interface and logging subsystem is I/O user interface including graphical animation and data logger of the simulation to be used for the assessment.

Marine Traffic Simulator (5)
- Tokyo Bay
AIS Simulator (1)

AIS Simulator is a system to simulate real-time AIS slot map of any ship in the gaming area, if all ship positions and status of navigation are given.

AIS Simulator (2)

Data can be provided either by AIS receiver/VTS or Marine Traffic Simulator.

AIS Simulator (3)

Slot conflicts and garbles due to radio communication can be analysed using this simulator.

Purpose

The authors have applied these simulators to Shanghai port area, one of the most congested waterways in the world to assess its safety or AIS communication conflicts and garbles.

Simulation Result

Marine traffic simulation of Shanghai port area

Simulation Result

Ship No. 1138 (red mark in lower right side)
Simulation Result

AIS slot map of ship no. 1138

Simulation Result

Relation between AIS slot garbles against number of ships passed

Simulation Result

Distribution map of AIS slot garbles

Huangpu River

- Waterway between Wu Song and Min Hang Power Plant
- Traffic Separation Scheme
- Speed limit of 8 knots
- Prohibition of overtaking

Marine traffic simulation result of Huangpu River area

Visualization of simulation

Ship's Speed

- Normal
- Crossing
- Avoiding
- Overtaking

Marine Traffic Simulator and AIS Simulator are briefly introduced.

They are applied for Shanghai Port area and Huangpu River in Shanghai.

They are good tools to evaluate safety of congested waterways or port area in qualitatively and quantitatively.

Conclusions
Thank you very much for your kind attention.
感谢聆听 请多赐教