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Case Based Reasoning System for Ship Turning Problem

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Abstract--- "Ship is the significant property of modern society. It's transport Expensive goods and contributes in country security. It's facing many critical emergency cases in sea, that time it's need a adviser, whose having experience to handle the situation.
Case-based reasoning (CBR) uses the same technique in solving tasks that needs reference from variety of situations. It can render decision-making easier by retrieving past solutions from situations that are similar to the one at hand and make necessary adjustments in order to adopt them. In this paper, we proposed a Case-based reasoning system for handling **ship turning problem** .The **CBR's** accuracy depends on the efficient retrieval of possible solutions, and the proposed algorithm improves the effectiveness of solving the similarity to a new case at another hand."

I. INTRODUCTION

This paper provides an insight into the action plan for handling emergency cases in ship that needs to be implemented. It talks about the cases, attributes, problems that will be required for success of emergency handling. The staffs and Expensive goods are too much important for ship. For this cause, to provide safety of staffs and expensive goods is the first priority. In this paper, talking about the action plans to handle the emergency situations in ship like as ship turning problem[1] .

CBR traces its roots to the work of Roger Schank and his students at Yale University in the early 1980s. Schank's
model of dynamic memory[2] was the basis for the earliest CBR systems: Janet Kolodner's CYRUS[3] and Michael Lebowitz's IPP[4]. Other schools of CBR and closely allied fields emerged in the 1980s, investigating such topics as CBR in legal reasoning, memory-based reasoning (a way of reasoning from examples on massively parallel machines), and combinations of CBR with other reasoning methods. In the 1990s, interest in CBR grew in the international community, as evidenced by the establishment of an International Conference on Case-Based Reasoning in 1995, as well as European, German, British, Italian, and other CBR workshops.

Here, in this paper we have developed a ship emergency system based on CBR that maintains a database of the previously occurred emergencies that are taken as a reference to provide likely Remedy for the current emergency cases. There was some relevant work on ship emergency system. The turning of moving object in Stable surface is too much easier than Unstable surface. Furl ship at sea is difficult because The sea surface is unstable . for the turning of ship these factors are too much important ship speed ,wind velocity, wind direction , propeller speed , wave making resistance For the safe ship turning required the turning angle and how long time take to turn that called turn time.This system takes the above factors as input and give output turning angle and turn time for turning of ship .

II. DESCRIPTION OF EMERGENCY CASES:

In this paper we have discussed about the ship turning problem.

The changing characteristic of the ship course and motion track is called ship turning [7]. The turning of moving object in the Stable surface is too much easier than unstable surface. Furl ship at sea is difficult because the sea provide unstable surface. The ship faces many problems in sea like iceberg, bridge other Rubbish[5]. To avoid the collision it requires turn angle and turn time, which are depends upon following factors:

1. Wind velocity.
2. Wind direction.
3. Ship speed.
4. Wave making resistance
5. Propeller speed
6. Turning Direction

III. Description of factors:

Wind velocity V_w , affect the speed of the ship . The speed of ship depend upon wind direction D_w.

If the wind is blowing in the direction of the ship in this case ship speed V_s increased and U_s

$$U_s = V_s + V_w \ldots\ldots(i)$$

If the wind is blowing against of the direction of the ship in this case ship speed V_s decreased.

$$U_s = V_s - V_w \ldots\ldots(ii)$$

The Resultant ship speed U_s is the important factor to turn ship. The turn angle β is inversely proportional to Resultant ship speed[6].

$$\cos\beta \propto U_s^{-1}$$

$$\beta \propto \cos^{-1}(U_s^{-1}) \quad \ldots(iii)$$

The Propeller speed is too much closer then ship speed V_s[7]. It's affected the turning angle of ship[8].

$$p_s \propto V_s \ldots\ldots(iv)$$

The wind direction affected the turning of ship β.

CASE1:

If the range of wind direction D_w between 0^0 to 180^0, $0^0 < D_w < 180^0$ and ship turn Right direction

or

If the range of wind direction D_w between 180^0 to 360^0, $180^0 < D_w < 360^0$ and ship turn Left direction

$$U_s = V_s - V_w$$
$$U_s = P_s - V_w$$

From eq.(iii)

$$\beta \propto \cos^{-1}(P_s - V_w^{-1}) \ldots(v)$$

CASE2:

If wind direction D_w between 0^0 to 180^0, $0^0 < D_w < 180^0$ and ship turn Left direction

or

If wind direction D_w between 180^0 to 360^0, $180^0 < D_w < 360^0$ and ship turn Right direction.

$$U_s = V_s + V_w$$
$$U_s = P_s + V_w$$

From eq.(iii)

$$\beta \propto \cos^{-1}(P_s + V_w^{-1}) \ldots(vi)$$

Wave making resistance R_w is simple in concept but difficult to quantify. As it moves through the water, the ship makes waves, which cost energy[10][12].

$$U_s^2 \propto R_w$$
$$U_s \propto \sqrt{R_w}$$

From eq.(iii)

$$\beta \propto \cos^{1}(\sqrt{R_w}^{-1}) \ldots(vii)$$

Finally proposed a equation

$$\beta \propto \sqrt{(\cos^{-1}(U_s^{-1}) * \cos^{-1}(\sqrt{R_w}^{-1}))} \ldots(viii)$$

If wind is blowing in ship direction

$$\beta \propto \sqrt{(\cos^{-1}(U_s^{-1}) * \cos^{-1}(\sqrt{R_w}^{-1}))}$$

$$\beta = x_1 * \sqrt{(\cos^{-1}(P_s + V_w^{-1}) * \cos^{-1}(\sqrt{R_w}^{-1}))} \ldots(ix)$$

If wind is blowing in ship's opposite direction:

$$\beta \propto \sqrt{(\cos^{-1}(U_s^{-1}) * \cos^{-1}(\sqrt{R_w}^{-1}))}$$

$$\beta = x_2 * \sqrt{(\cos^{-1}(P_s - V_w^{-1}) * \cos^{-1}(\sqrt{R_w}^{-1}))} \ldots(ix)$$

x_1 , x_2 are proportionally constants.

A .FOR THE CURRENT CASE:

If the ship turns in the wind blowing direction. Then turning angle

$$\beta_1 = x_1 * \sqrt{[\cos^{-1}((P_{s1} + V_{w1})^{-1}) * \cos^{-1}(\sqrt{R_{w1}}^{-1})]}$$

$$x_1 = \beta_1 * \{\sqrt{(\cos^{-1}(P_{s1} + V_{w1}^{-1}) * \cos^{-1}(\sqrt{R_{w1}}^{-1}))}\}^{-1} \ldots(xi)$$

If the ship turns against of the wind blowing direction , then turning angle

$$\beta_1 = x_2 * \sqrt{[\cos^{-1}((P_{s1} - V_{w1})^{-1}) * \cos^{-1}(\sqrt{R_{w1}}^{-1})]}$$

$$x_2 = \beta_1 * \{\sqrt{[\cos^{-1}((P_{s1} - V_{w1})^{-1}) * \cos^{-1}(\sqrt{R_{w1}}^{-1})]}\}^{-1} \ldots(xii)$$

B. FOR THE PREVIOUS CASE:

If the ship turns in the wind blowing direction. Then

$$\beta_2 = x_1 * \sqrt{[\cos^{-1}((P_{s2} + V_{w2})^{-1}) * \cos^{-1}(\sqrt{R_{w2}}^{-1})]}$$

$$x_1 = \beta_2 * \{\sqrt{(\cos^{-1}(P_{s2} + V_{w2}^{-1}) * \cos^{-1}(\sqrt{R_{w2}}^{-1}))}\}^{-1} \ldots(xiii)$$

If the ship turns against of the wind blowing direction

$$\beta_2 = x_2 * \sqrt{[\cos^{-1}((P_{s2} - V_{w2})^{-1}) * \cos^{-1}(\sqrt{R_{w2}}^{-1})]}$$

$x_2 = \beta_2 * \{\sqrt{} [\cos^{-1}((P_{s2} - V_{w2})^{-1}) * \cos^{-1}(\sqrt{}R_{w2}^{-1})]\}^{-1}$ …(xiv)

Compare x1 eq.

If the ship turns in the wind blowing direction. Then turning angle

$\beta_1 * \{\sqrt{} [\cos^{-1}(P_{s1} + V_{w1}^{-1}) * \cos^{-1}(\sqrt{}R_{w1}^{-1})]\}^{-1}$

$= \beta_2 * \{\sqrt{} [\cos^{-1}(P_{s2} + V_{w2}^{-1}) * \cos^{-1}(\sqrt{}R_{w2}^{-1})]\}^{-1}$

$\beta_1 = \beta_2 * \{\sqrt{} [\cos^{-1}(P_{s2} + V_{w2}^{-1}) * \cos^{-1}(\sqrt{}R_{w2}^{-1})]\}^{-1} * (\sqrt{} [\cos^{-1}(P_{s1} + V_{w1}^{-1}) * \cos^{-1}(\sqrt{}R_{w1}^{-1})])$ …..(xv)

Compare x2 eq.

If the ship turns against of the wind blowing direction then turning angle

$\beta_1 * \{\sqrt{} [\cos^{-1}(P_{s1} - V_{w1}^{-1}) * \cos^{-1}(\sqrt{}R_{w1}^{-1})]\}^{-1}$

$= \beta_2 * \{\sqrt{} [\cos^{-1}(P_{s2} - V_{w2}^{-1}) * \cos^{-1}(\sqrt{}R_{w2}^{-1})]\}^{-1}$

$\beta_1 = \beta_2 * \{\sqrt{} [\cos^{-1}(P_{s2} - V_{w2}^{-1}) * \cos^{-1}(\sqrt{}R_{w2}^{-1})]\}^{-1} * \{\sqrt{} [\cos^{-1}(P_{s1} - V_{w1}^{-1}) * \cos^{-1}(\sqrt{}R_{w1}^{-1})]\}$

IV GRAPHS:

User select the options , then click Adaptation button . After the clicking of the Adaptation button we get three graphs :

a. Graph 1, shown in fig 5
b. Graph2 ,shown in fig 6
c. Graph3, shown in fig 7

User selected the graphs, in which new case are much similar to previous case. In Graph 1 and Graph 2 new case is similar to previous case. With using of this graphs we calculate the turning angle.

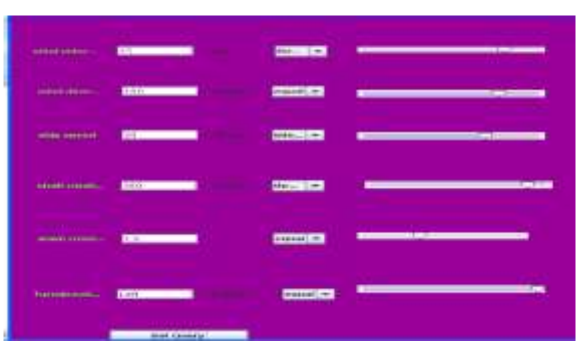

Fig .1

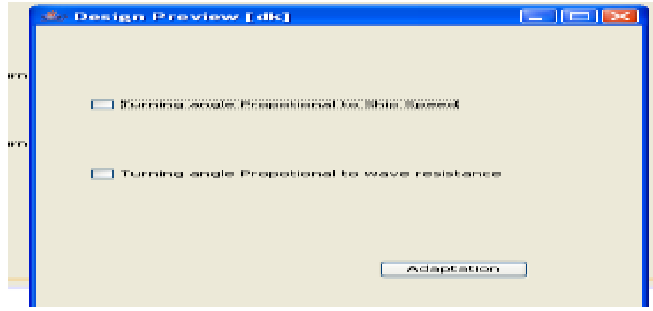

Fig. 2

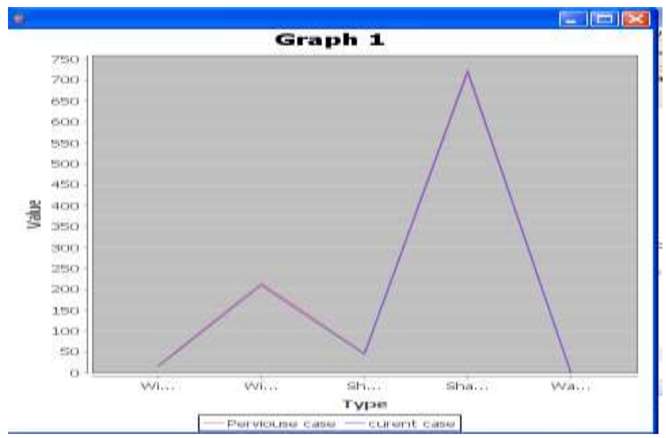

Fig : 3

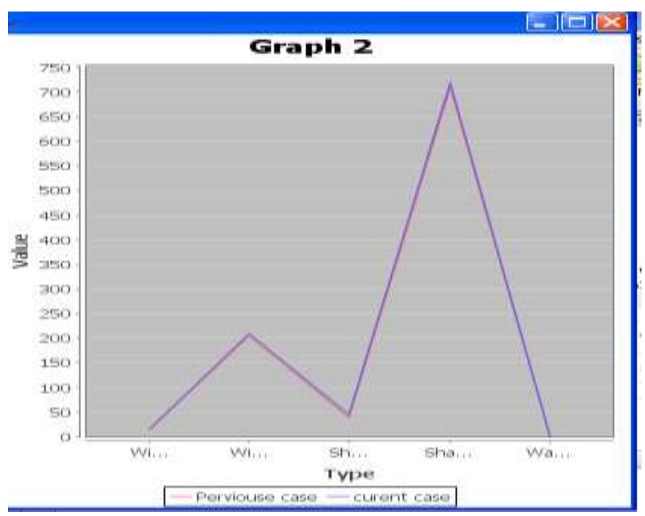

Fig : 4

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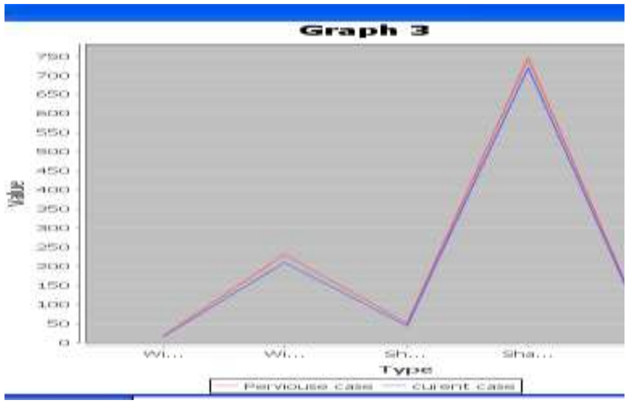

Fig : 5

V. CONCLUSION:

In this paper, we suggest the handles the turning problem in the sea. During shipping it is necessary to provides the information about the turning inclination to the captain of the ship to drive it safe. We are proposing the future work , The pre track missiles path before hitting the ship. During the shipping it is very necessary to handle all these activities through tracing the attacks before attacking on ship.

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