Case Based Reasoning System for Fire Control in Society

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Abstract---*"Society is very important part of human life. It faces many problems. Fire problem is one of the major problems that affect the human society physically, mentally and financially. In these critical situations, the controller of fire brigade needs to take decisions to handle the situation. In this paper, we are going to present a case based reasoning system that helps the controller to get no. of fire fighter and fire brigade vehicle·The instructor of fire brigade must need to decide how much fire-fighter needed to control the fire. if the fire more than one place , at that time controller need to manage the vehicle and fire fighter to handle a the condition. CBR systems take each condition as a new condition then plotting the graph. The instructor compares this new condition with previous condition and select one or more than one conditions, which are too close to new condition .CBR system display no of fire fighter and fire vehicle."*

I. INTRODUCTION

Human is part of society. Society facing much difficulty creates by living being or environment like violence, earthquake, water problem, fire problem .fire problem is critical condition that may be cause of living beings or environment. The fire affects the human beings and natural resource. There having many factors that affect the intensity of fire like humidity, wind velocity, cause of fire, hazardous material, fuel etc. the instructor of fire brigade must need to decide how much fire-fighter needed to control the fire. If the fire more than one place, at that time controller need to manage the vehicle and fire fighter to handle the condition. CBR system takes each condition as a new condition then plotting the graph. The instructor compares this new condition with previous condition and select one or more than one conditions, which are too close to new condition .CBR system display number of fire fighter and fire vehicle[3][4].

II. CASE-BASED REASONING

Case-based reasoning is that it is an approach to solving problems by using previous experiences. It involves retaining a memory of previous problems and their solutions and, by referencing these, solves new problems. A case-based reasoner will be presented with a problem[6]. It may be presented by the system, programs, user or another system. The case-based reasoner then searches its database of previous cases and attempts to find a case that has the same problem detail as the current case. If the reasoner cannot find an identical case in its case base, it will attempt to find the cases in the case base that most nearly match the current query case. In the situation where a previous unclear case is retrieved, assuming its solution was successful, it can be returned as the current problem's solution. In the more probable case that the recovered case isn't indistinguishable from the current case, an adjustment stage happens. In the adaptation, the differences between the current case and the retrieved case must first be identified and then the solution associated with the retrieved case modified taking into account these differences. The solution returned in response to the current problem specification may then be tried in the appropriate area. The structure of a case-based reasoning system along these lines is for the most part prepared in a way that mirrors these distinctive stages. At the biggest sum, a case-based reasoning (CBR) structure can be thought of as a revelation that solidifies the reasoning segment and the external perspectives[7][8].

III. CASE-BASED REASONING CYCLE

Case-Based Reasoning can be summarized by a schematic basic reasoning cycle. In Aamodt and Plaza [Aamodt & Plaza, 1994] they adopt the four principle tasks retrieve, reuse, revise, and retain [1].

a. ***Retrieve***: Find most similar case (s) to the new case.
–similitude measures
– Clarification based techniques
– Case-base association (information structures)

b. ***Reuse*** **or** ***Adapt***: the information and knowledge in that case to solve the new case. The selected best case has to be adapted when it does not match perfectly the new case.

–distinctive kinds of arrangement transformation (none, intelligent ,derivational etc.)

– distinctive techniques (control based, imperative fulfillment, display based etc.)

c. ***Revise* or *Evaluate*** of the proposed solution. A CBR-user usually requires some feedback to know what is going right and what is going wrong. Usually, it is performed by simulation or by asking to a human oracle.
–no check
– Check by reproduction
– Check in reality

d. ***Retain* or *Learn*** the parts of this experience likely to be useful for future problem solving. The user can learn both from successful solutions and from failed ones (repair).
–learn new cases
–learn similarity assessment
–learn case base organization
–learn solution adaptation

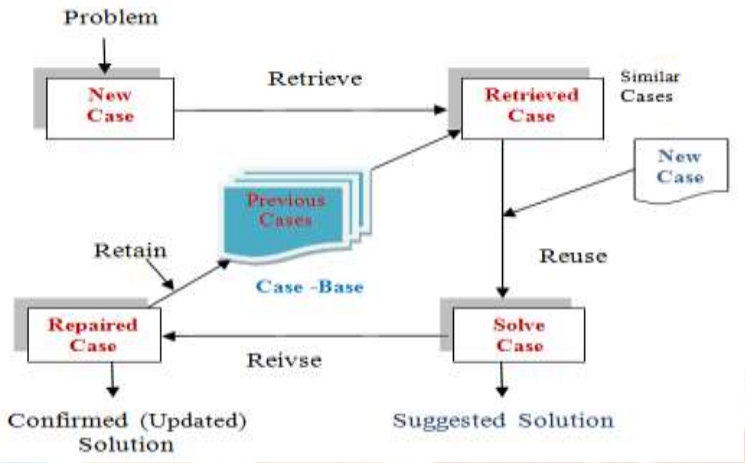

Figure: 1. The CBR cycle. Adapted from (Aamodt & Plaza, 1994).

IV.THE CBR SYSTEM WORK

Case-based reasoning is a knowledge-based problem solving and decision support. A new problem is solved by remembering a previous similar situation and by reusing information and knowledge of that situation. a case-based reasoning system that helps the controller to get no. of fire-fighter and fire brigade vehicle. The instructor of fire brigade must need to decide how much fire-fighter needed to control the fire. if the fire more than one place, at that time controller need to manage the vehicle and fire-fighter to handle the condition. CBR system take each condition as a new condition then plotting the graph. The instructor compares this new condition with the previous condition and selects one or more than one conditions, which are too close to new condition.CBR system displays the number of fire-fighter and fire vehicle.

System Algorithm:

Step1: Compute the local similitude (that is, each element of the new case and existing case highlights).

Step 2: Compute the worldwide similitude (closeness between existing case and new case):

$$Similarity(Case^N, Case^R) = \sum_{i=1}^{n} w_i * sim(f_i^N, f_i^R) \Big/ \sum_{i=1}^{n} w_i$$

Wi= Level of centrality of a component.
Sim = Similitude capacity of highlights.
$f^N i$ and $f^R i$furthermore, are values i for include in the information and recovered cases separately.

Step3: Sort the likeness esteems in climbing request

Step 4: The more comparative case is recovered.

By applying the nearby comparability measure, the likeness between highlights of different cases for the situation base and the new case were acquired. The Global similitude measure is then connected to locate the most comparative existing case. The choice given to the case that shows up with the most noteworthy esteem is likewise given to the new case [5].

V. DESCRIPTION OF EMERGENCY CASES

In this paper basically, discuss on Fire problem:

The instructor of fire brigade must need to decide how much fire-fighter needed to control the fire. If the fire more than one place, at that time controller need to manage the vehicle and firefighter to handle the condition [4].
The intensity of the fire, which depends upon following factors

1) Wind velocity(Vw)
2) Wind direction(WD)
3) Distance(D)
4) Humidity(H)
5) Covered area (CA)
6) Cause of fire (CF)
7) Sensitive area(SA)
8) Fire intensity(IF)

VI. DESCRIPTION OF FACTORS

Wind velocity V_w , affect the intensity of fire int_fire. $Vw \propto IF$ ……(i)
Wind direction WD, affect the intensity of fire int_fire. $WD \propto IF$ ……(ii)
Distance D, affect the intensity of fire int_fire. $D \propto IF$ ……..(iii)
Humidity HD, affect the intensity of fire int_fire. $HD \propto IF$ ……(iv)
Covered area CA, affect the intensity of fire int_fire. $CA \propto IF$ ……(v)
Cause of fire CF, affect the intensity of fire int_fire. $CF \propto IF$ ……...(vi)
Sensitive area SA, affect the intensity of fire int_fir $SA \propto IF$ ..……(viii)

Now

$$Vw * WD * SA * CA * D * CF * HD \propto IF$$

Intensity of fire directly proportional to no of fire fighter $FF \propto IF$……(ix)
Intensity of fire directly proportional to no of fire BRIGADE vehicle $FV \propto IF$……(x)

Compare All Equation: (i) to (x)

$$Vw * WD * SA * CA * D * CF * HD * FF * FV \propto IF$$
$$IF = K * Vw * WD * SA * CA * D * CF * HD * FF * FV \quad \ldots\ldots\ldots(xi)$$

CASE 1:

$$IF\_1 = K * Vw\_1 * WD\_1 * SA\_1 * CA\_1 * D\_1 * CF\_1 * HD\_1 * FF\_1 * FV\_1.$$

CASE 2:

$$IF\_2 = K * Vw\_2 * WD\_2 * SA\_2 * CA\_2 * D\_2 * CF\_2 * HD\_2 * FF\_2 * FV\_2.$$

Compare case 1 and case 2:

$$\frac{IF_1}{IF_2} = K * \frac{(Vw_1 * WD_1 * SA_1 * CA_1 * D\_1 * CF\_1 * HD\_1 * FF\_1 * FV\_1)}{(Vw_2 * WD_2 * SA_2 * CA_2 * D\_2 * CF\_2 * HD\_2 * FF\_2 * FV\_2)}$$

Benefits of case base reasoning

i. It enables the reasoner to propose answers for an issue rapidly.

ii. It enables the reasoner to propose arrangements in spaces that are not totally comprehended by the reasoner.

iii. It gives the reasoner a methods for assessing arrangements when no algorithmic technique is accessible for assessment.

iv. Cases are helpful in translating open-finished and poorly characterized ideas.

v. Remembering past experience is valuable to help user to abstain from rehashing past oversights.

vi. Cases help the reasoner to centre around its thinking on imperative parts of an issue by pointing out what highlights of an issue are critical ones.

VII. GRAPH

we get three graphs : a) Graph 1, shown in fig_1, b) Graph 2, shown in fig_2, and c) Graph 3, shown in fig_3. Userselected the graphs, in which new case are much similar to previous case. In Graph 1 and Graph 2 new case similar to previous case. With using of this graph we calculate the number of fire brigade.

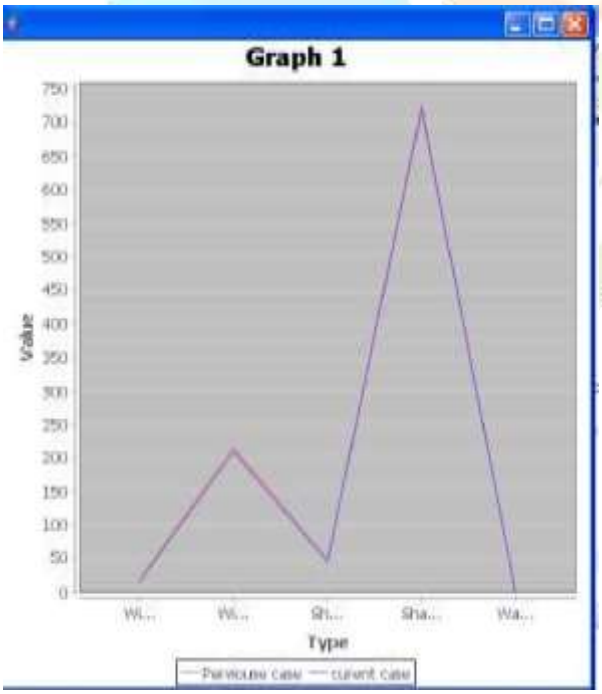

Figure: a. Graph 1, shown in fig_1

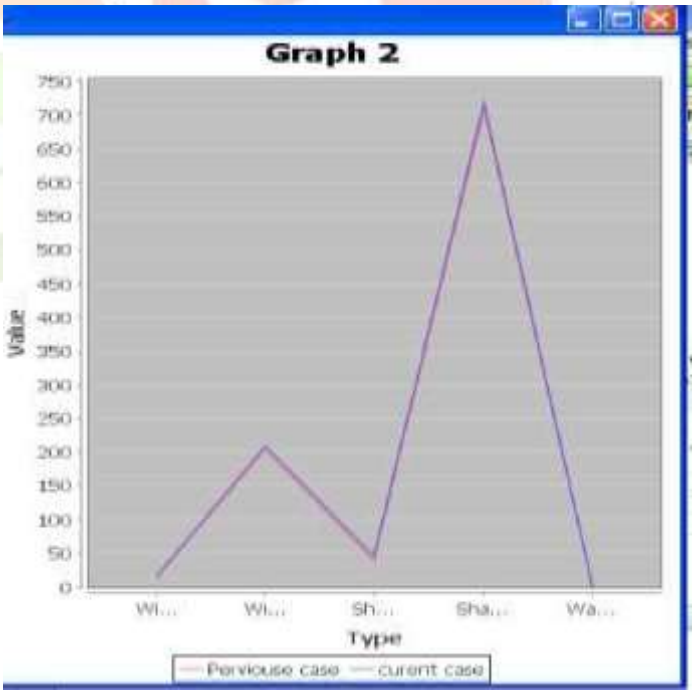

Figure: b. Graph2, shown in fig_2

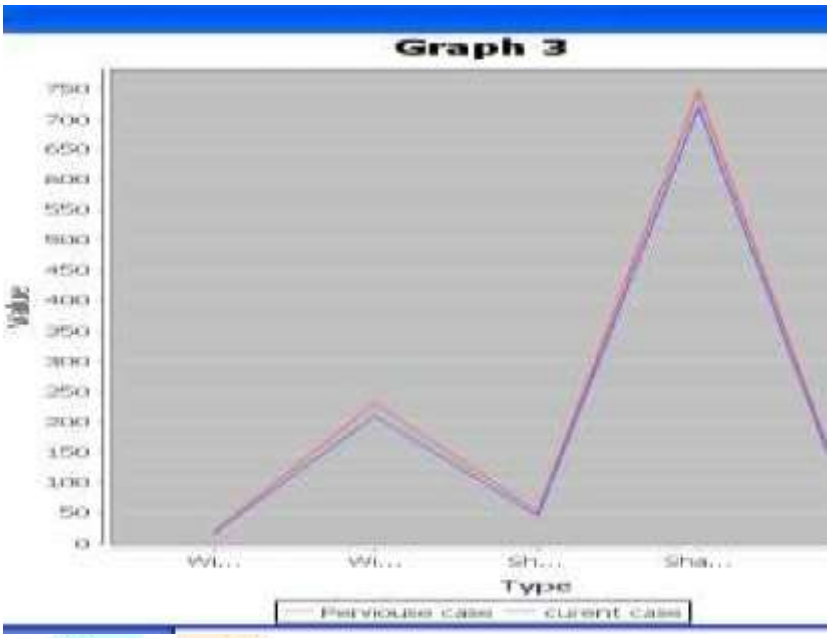

Figure: c. Graph3, shown in fig_3

VIII. CONCLUSION

In this paper, we suggest the handles the fire problem in the forest or society. Fire is a critical condition that affects the human and natural recourses to live an effective life we must need to control this problem. A user gets confidence in a system that provides the correct solution. In any case, confidence is also improved in systems where the decision-making process can be recognized and the resolved.CBR is a simple system to design solve the user problems and give the correct solution .the system is user-friendly and identify user problem.

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