A Review on Rough set theory and Proposed Models to enhancement Maintenance Performance

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Abstract

In the last decades, the importance of the maintenance and the maintenance management increased. The widespread of using the machines increase the maintenance activities and the maintenance costs. Maintenance costs become part of the normal accounting of the facility. The increases in the maintenance costs make the facility manager focus on the maintenance and the maintenance management to expand the proficiency and effectiveness of the maintenance performances. We Propose rough set theory models to assist in the maintenance management, data analyzes and knowledge extraction so it improves the maintenance performances

Keywords: rough set theory ;maintenance management ;knowledge.

1. Introduction

Maintenance departments are try umteen challenges because of the increases in the maintenance activities with the regulation resources (financially,scientifically). One of the main functions in computerized reparation management group is the analyzes of maintenance aggregation,time the maintenance data is immense, it is embarrassing to watch the limitations of the variables to analyzes the assemblageand get the noises so one needs mechanization tools to do it specified as rough set tools[1, 2]. There are umpteen rough set techniques to do it such as categorization and clustering. The 2nd family predicts the later trends of thevariables, there are umpteen data mining techniques to do it specified as divagation analyzes and prevision[3-5].

2. Maintenance Concept

The dictionaries define the maintenance as follows: "the work of keeping something in proper condition" [6].This would involve that Maintenance should be actions used to make the devices lengthwise expeditiously[6,7]

Unfortunately, both private and government sections consider the maintenance actions that are taken after the devices broken, this is a wrong concept. The maintenance keeps the devices running efficiently, there are many fields maintenance that are taken to prevent the devices to break these fields as air-conditioner and motor-vehicle.[6, 7].

2.1 Maintenance Type

1. Reactive maintenance

The principle of reactive maintenance is "run it till it broken"[6] maintenance mode, this LEADS no action taken to maintenance specific device until it is broken.

There are many studies witch indicate the reactive upkeep is still the prevalent method of upkeep.

Feature of reactive upkeep

a- No high cost.

b-   Fewer staff.

Negatives of reactive upkeep

a-   Inefficient use of staff resources.

b-   Possible secondary devices or equipment or processes damage.

c- Inappropriate in many disciplinary such as air-conditioner and motor-vehicle.

2- Preventive maintenance

Preventive maintenance is defined as actions performed based on schedule to prevent the devices failures and ensure continuous working without interruption.

Many fields depend on the preventive maintenance where the maintenance is taken to prevent the devices, such as air-conditioner and motor-vehicle fields.

Feature of preventive upkeep

a-   Efficient use of staff resources.

b-   Increased part vivification cycle.

c-   Reduced equipment or cognition unfortunate.

d-   Estimated 12% to 18% value savings over reactive upkeep.

e-   Ensure continuous devices working without interruption.

Negatives of preventive upkeep

a- Catastrophic failures relieve likely to become.

b- Labor qualifier.

c- Includes execution of unneeded upkeep.

d- Potential hurt devices in conducting unneeded upkeep[6]

3 -Predictive maintenance

Predictive maintenance is defined as actions performed based on indicators such as temperature and pressure to prevent the devices failures and ensure continuous working without interruption.

The disagreement between the predictive upkeep and the preventive upkeep is that the preventive upkeep is supported on actualized healthiness time the predictive upkeep is supported on a preset schedule.

Feature of predictive upkeep

a-   Increased factor lifetime oscillation.

b-   Reduced equipment or touch nonstarter.

c-   Decreased the upkeep costs.

e-   Estimated 8% to 12% outlay fund over protective upkeep.

f- Ensure continuous devices working without interruption.

Negatives of predictive upkeep

A- Increased finance in characteristic science.

B-Increased assets in staff breeding[6]

2.2 Percentage of Maintenance Type

• 55 Percentage Reactive upkeep.

• 31 Percentage Preventive upkeep.

• 12 Percentage Predictive upkeep.
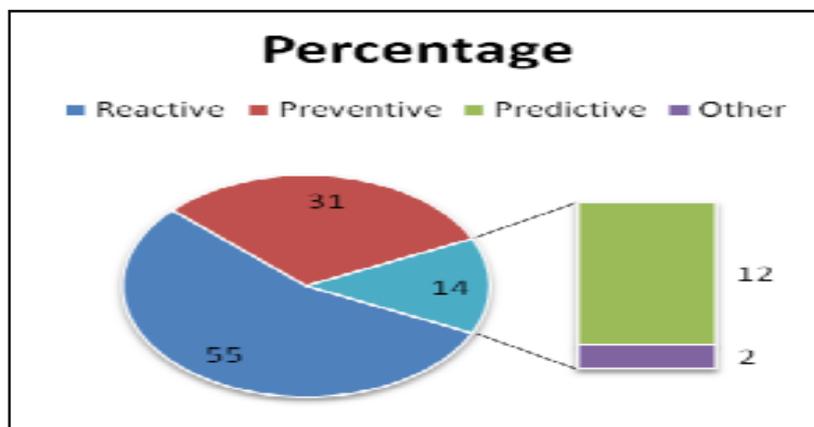
• 2 Percentage   Other.

Figure 1: Maintenance Type

2.3 .Rough Set Theory

The rough set theory was proposed via Pawlak in 1980 as a math tool to distribute with uncertainty. Rough set theory only says that the set

of objects analyzed imply the knowledge and knowledge is considered a classification ability of objects [8].

The basic concepts of the Rough Set Theory can be distinct by means of operation, closing and internal called approximations..

2.3.1 Information System[8]:

An information system is four tuple $\delta = (\cup, A, V, F)$, Where

- $\cup = \{\delta_1, \delta_2, \delta_3, \ldots, \delta_n\}, |\cup| = n,$ $\cup$ is a non-empty set of finite objects called universe.
- $A \neq \emptyset$, A is a finite set of attributes.
- V Be a set of values set .
- $V = \cup_{a \in A} V_a, v_a$ is represent the domain of attribute a.
- F be an information function.

denoted by $F : \cup \times A \to V$, $F(\delta, a)$ belong to V_a, all $(\delta, a) \in \cup \times A$, such as database contains n sites, such that $\cup$ =n, and m attributes, such that $A = \{a_1, a_2, a_3, \ldots, a_m\}$ such that $|A| = m$, This can be illustrated in terms of an information system table to decide clusteringsupported the rough set algorithms as the following table 1

Table 1: An information system

$\cup$	a_1	a_2	... ...	$a_{|A|}$
δ_1	$F(\delta_1, a_1)$	$F(\delta_1, a_2)$	... ...	$F(\delta_1, a_m)$
δ_1	$F(\delta_2, a_1)$	$F(\delta_1, a_2)$	... ...	$F(\delta_2, a_m)$
δ_3	$F(\delta_3, a_1)$	$F(\delta_3, a_2)$	... ...	$F(\delta_3, a_m)$
n	$F(\delta_n, a_1)$	$F(\delta_n, a_2)$	... ...	$F(\delta_n, a_m)$

Thus, we proposed in this article review a models of Rough Set Theory that supports   the decision-makers and it may potentially advance to give a suggestion how to system engagement in arrangement to modify the efficiency of the upkeep unit performance by utilizing Rough Set models (The Lower and Upper Approximation) as shown in Figure 2.
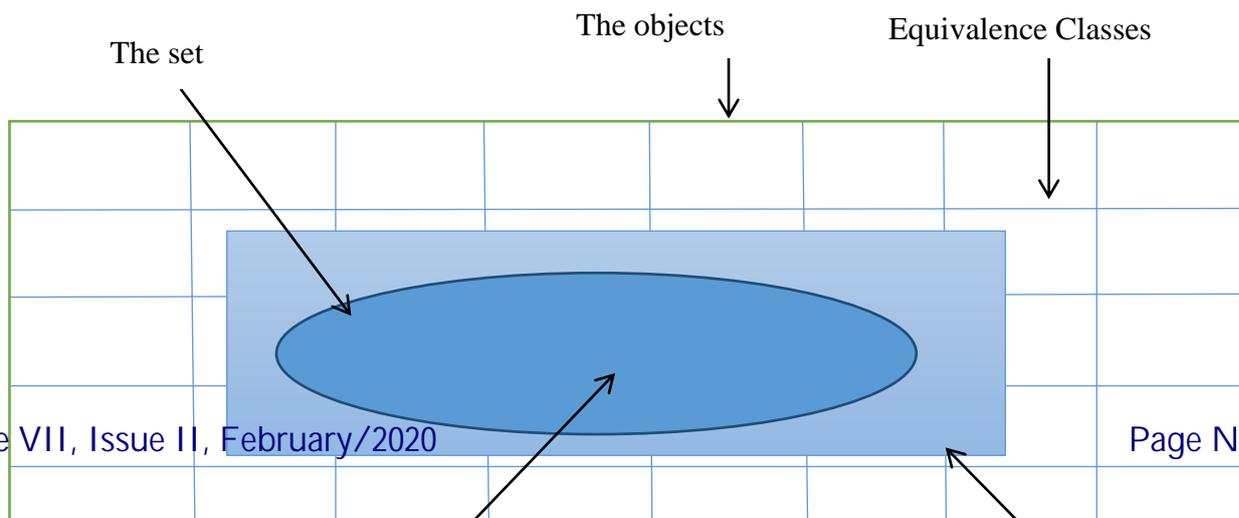
The set

The objects

Equivalence Classes

Figure 2. Set of approximation

2.3.2 Application of rough set theory[9] :

a- The medical diagnosis
b- Prediction and control
c- Intelligent emotion recognition
d- Power system and industry
e- image processing and
f- Remote sensing image processing
g- Image segmentation, enhancement and classification
h- Analyzing data of gene expression and Intelligence analysis
i- Intrusion detection.

Conclusion

This paper review suggests the Rough set theory models that influence on Maintenance Performance Via analyzes of the maintenance data and extracts new Also, Rough set an automation tool makes it easy to be used when the data is huge. Where is very hard to determine the limitations of the variables to use them in the traditional queries to analyzes the data and extract the knowledge.

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