GREY MODEL TECHNIQUE

A.SENTHILRAJAN

Abstract:-Real time data bases are widely applied in time critical applications, such as the robot navigation ,real time monitoring and agriculture etc, These applications usually requires real time data bases can provide twenty four hours continuously throughout the year. However, real time databases cannot completely avoid the failures. The prediction recovery scheme allows the execution of transactions during recovery by providing predictive image of damaged image to these transactions that need immediate access to those image items.

Keywords: Data bases, Images, Prediction, Real time, Recovery.

Introduction : One class of applications, such as robot navigation, real-time agriculture monitoring, etc., usually require real time data bases, which are able to process the timing constraints of data and transactions, can provide throughout the year. Minor failures can cause transaction aborted or part data unavailable and severe failures will result in system crash.

With respect to failure recovery, a lot of research has been performed. Choi [1] presented parallel processing architecture adopting double-CPU. In this architecture, one CPU, which is called as DP (data base processor), is responsible for usual. transaction processing, while another CPU called as RP (Recovery Processor) only responsible for recovery processing, like check point and recovery. This recovery avoids disks I/O during transaction processing and has better performances than traditional single CPU, but the utilization of RP is not high. To aim at low efficiency of traditional recovery methods based on sequence of traditional recovery methods based on sequential permanent logging, partitioned logging [2],[3] and ephemeral logging [4] ,[5] have been proposed. Partitioned logging stores the log records according to transaction class, the log records belonging to different transactions class are stored in different partitions, but each transactions class has a sequential log in the same partition associated with it. Partitioned logging can avoid performance bottleneck caused by server contention for single logging store partition. However, the problems of how to classify transactions and how to make the standards of logging partitions must be solved for partitions logging. Ephemeral logging adopts for non-volatile high speed store as logging storage device. For ephemeral logging when transaction commits, the data buffers modified by the transactions need to be flushed into stable storage devices. So, the log records may be deleted as soon as the transaction commits. The main advantage of ephemeral logging is log processing time after failures is reduced prominently, while the disadvantage is not convenient to audit and trace. The proposed system overcomes by providing predictive values of damaged images to these transactions that need immediate access to those images.

Recovery system : The objective of the recovery system architecture present here is to provide the ability of preventing or delaying failures by self-perceptive, self-diagnosing and self-adaptive mechanisms and the ability of allowing transaction execution during recovery and providing predictive values of damaged images. Figure1 show the recovery system architecture. The components inside dotted boundary are found in conventional database systems. Our recovery system architecture adds Error perception, Error Diagnosis, Error Repairer and predictive Value Generator mobiles. The function of the Error Perception is to perceive the latent errors and hidden troubles by means of Error Characteristic Database. The Error Diagnosis is responsible for making a definite diagnosis to the error captured by the Error perception and by the aid of the related knowledge database. The Predictive Value Generator is responsible for generating predictive values of damaged images and providing them to these transactions that need immediate access to those images.

An intelligent agent perceives its environment, makes an informed decision based on its

perceptions and reacts. An informed decision is a choice made based on knowledge, intelligent agent has the basic characteristic as follows.

a) Independent, the agent does not need any intervention.
b) Active, agent can work automatically when there is a need.
c) Conscious, agent can express its behaviour to object.

The characters of intelligent agent do favour to accomplish the above functional modules. Here the main focus is on the predictive value generator, which is responsible for generating predictive values of damaged image and provide them to transactions that need immediate access to those image.

d) Social, agent can interact with other agents.

2. **Recovery Scheme :** Traditional database systems, after the damaged images are identified the recovery system blocks users from accessing the database. It prevents the execution of transactions until recovery is completed. The recovery system is completely block all transactions. Alternately the scheme only blocks the unsafe transactions that need immediate access to a damaged image. For many time the real time applications the value of a data object that models an object in the external environment cannot, in general, be updated continuously to perfectly track the dynamics of the external object. Therefore, for real time database system, it is unnecessary and unacceptable that active transactions are blocked until all damaged images are recovered.

The proposed system recovery overcomes the problem by adopting the prediction recovery scheme, that allows execution of unsafe transactions by providing the new predictive values to them. The proposed system, a recovery system architecture a prediction model based on grey theory is developed for the predictive value generator.

3. Grey Model modelling method

The Grey Model is newly developed method based on grey theory. As soon as information is concerned the systems which lack information, such as structural message, operation mechanism and behaviour document are referred to as Grey Systems. The goal of Grey system and its applications is to bridge the gap existing between social science and natural science.

In the proposed method, the linear dynamic prediction model a single variable is applied for generating the values of damaged images. Grey model using the one variable produces the predictive value by the accumulated generating operation of the sample data and its method is given in the algorithm.

1. Let $\chi^{(0)} = \left(\chi^{(0)}(1), \chi^{(0)}(2), \ldots . \chi^{(0)}(n)\right)$ be the sample series.
2. A data series $\chi^{(1)} = \left(\chi^{(1)}(1), \chi^{(1)}(2), \ldots . \chi^{(1)}(n)\right)$ is produced by the AGO.
3. Perform the algebraic mean operation on the above $x^{(1)}$ series. The data series

$$Z^{(1)}.\mathrm{K} = \left(Z^{(1)}.(2), Z^{(1)}.(3), \ldots . Z^{(1)}.(n)\right)$$

is obtained. Where

$$Z^{(1)}.(\mathrm{K}) = \frac{1}{2}\left[\chi^{(1)}.(\mathrm{K}-1) + \chi^{(1)}(\mathrm{K})\right]$$

K=2, 3,.....n

4. Apply Grey differential equation.
5. Obtained the co-efficient values for **a** and **b** using the learn square method.
6. Once the **a** and **b** values are obtained the grey model using the one dimension variable can be used to predict the value of data object **x** at time instant using the equation.

$$\chi^{(1)}(\chi+1) = \left(\chi^{(0)}.(1) - \frac{b}{a}\right)e^{-ak} + \frac{b}{a}$$

$$\chi^{(0)}(\mathrm{K}+1) = \chi^{(1)}(\mathrm{K}+1) - \chi^{(1)}.(\mathrm{K})$$

4. Grey prediction control

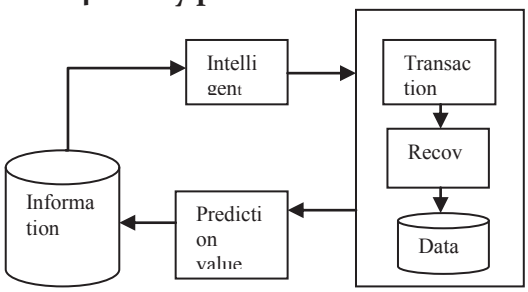
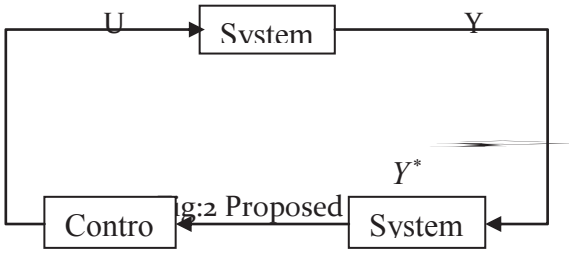


Fig:1 Grey prediction control

The Control principle of conventional control theory, whether classical or modern, is to control the system behaviour according to the state sample which has already occurred. It is then referred to as an afterward manner for the control. The essential idea of grey prediction control is to control the system behaviour in advance with the control strategy obtained from the prediction controller based on

grey model with one dimension. The figure shows the outline for a grey prediction control system.

It maintains a desired state within reasonably accurate tolerances even though the output Y is varied.



Grey Prediction control system the output of the system is denoted as Y, the prediction value of the system behaviour is denoted as $\hat{Y}(0)$ from the grey model. The assigned quantity is denoted as Y^* and the U is a control output.

Sampled data is feed is to the prediction controller grey model 2, which functions as a computer. The prediction value $\hat{Y}(0)$ as a calculated result of grey model 2 is delivered to the control strategy. Which constitutes a control as compared with Y^*, the control strategy " U " stems from segment 3 and then stored therein. The behaviour $Y^{(0)}$ occurs in the future, the stored strategy U will deal with it and lead the systems behaviour to a desired state.

5. Simulation Results

Simulations were conducted to verify the behaviour and response time of proposed technique. Response time is defined as time since request was sent until reply reaches the back images from the database response time is twice of the discovery time. Because the response time of the proposed technique does not worsen drastically even the time taken between request and reply from the data base increases, the proposed scheme is quite effective in terms of response time in erratic operating environment. The one dimension grey model adopts relative error to denote prediction accuracy. Prediction accuracy enhances with the increase of dimension of model. When dimension of the grey model exceeds 25, further increment of dimension has not been able to improve obviously prediction accuracy. Grey model to be considered with the requirements of both prediction accuracy and real-time performance, 15 or 17 dimension is usually adopted in practical systems. For the traditional database systems, after the damaged images are identified the recovery system prevents the execution of transactions until recovery is completed. Obviously, the traditional recovery scheme degrades the system performance seriously and cannot meet the need of the time-critical applications. The proposed scheme allow the execution of transaction during recovery by providing predictive values of damaged images to these transactions that need immediate results show that the prediction recovery improves the system performance prominently and do a favour to reduce the missing deadline ratio of transaction

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A.SenthilRajan
Alagappa University, Computer Centre,
agni_senthil@yahoo.com