A SYNOPSIS ON CRICKET TEAM SIMULATOR Using Artificial Intelligence

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The Project is directed for the following functions:

1.) To prepare a main pool of 100 players

2.) Display the database corresponding to the selected player.

3.) Providing functionality to compare the records of the players

4.) Produce a team best suited for the given conditions.

5.) Providing functionalities through simple mouse click operations.
Application & Future Scope

-> This project can be used in cricket team selection procedures both at the national as well as the international level.

-> Such an application can also be used for selection in other team sports such as football, hockey, basketball, rugby, etc by modifying a few of its parameters.

-> This project can be used in any field which involves selection procedures.

Limitations

-> This software takes into account only statistical data of the players. Abstract factors such as frame of mind, confidence level, instincts are not incorporated.

-> Available records are insufficient to judge a players fielding skills.

-> The player database has to be constantly updated.
PURPOSE

➔ To overcome the shortcomings of the current manual selection process, namely:

- The cricket board being partial to certain players even though they perform poorly repeatedly, thereby encouraging favoritism.

- Due to the vast pool of available players, talented players which deserve a chance may be overlooked or left out.

- Selectors preferring players from their own states or zones due to local pressure.

➔ To ensure that the best possible team is selected for a particular scenario i.e. on the basis of ground conditions, venue of the match, opposition team composition.
PROPOSED SYSTEM

The aim of this project is to enable the user (selector) to select the best possible team by providing the inputs.

Through simple mouse operations, the user can provide the selection criteria on the basis of which the team will be selected. He can either allow or disallow certain parameters which is illustrated in the images shown below :-

![Image of selection criteria]

![Image of number of players]

- TEST
- ONE DAY
- T20

15

NEXT
Genetic Algorithms (GAs) are adaptive heuristic search algorithm based on the evolutionary ideas of natural selection and genetics.

A GA operates through a simple cycle of stages:
- Creation of a ‘population’ of strings (i.e. chromosomes)
- Evaluation of each string
- Selection of best strings
- Genetic manipulation to create new population of strings
Selection operator

There are many different techniques which a genetic algorithm can use to select the individuals to be copied over into the next generation, but listed below are some of the most common methods:

- **Elitist selection:**
  The best fit members of each generation are guaranteed to be selected.

- **Fitness-proportionate selection:**
  More fit individuals are more likely, but not certain, to be selected.

- **Roulette-wheel selection:**
  A form of fitness-proportionate selection in which the chance of an individual's being selected is proportional to the amount by which its fitness is greater or less than its competitors' fitness.

- **Scaling selection:**
  As the average fitness of the population increases, the strength of the selective pressure also increases and the fitness function becomes more discriminating. This method can be helpful in making the best selection later on when all individuals have relatively high fitness and only small differences in fitness distinguish one from another.
Tournament selection: Subgroups of individuals are chosen from the larger population, and members of each subgroup compete against each other. Only one individual from each subgroup is chosen to reproduce.

Rank selection: Each individual in the population is assigned a numerical rank based on fitness, and selection is based on this ranking rather than absolute difference in fitness.

Generational selection: The offspring of the individuals selected from each generation become the entire next generation. No individuals are retained between generations.

Hierarchical selection: Individuals go through multiple rounds of selection each generation. Lower-level evaluations are faster and less discriminating, while those that survive to higher levels are evaluated more rigorously.
After selection of the population strings is over, the genetic manipulation process consisting of two steps is carried out. In the first step, the ‘crossover operation’ that recombines the bits (genes) of each two selected strings (chromosomes) is executed.

**Crossover Operation:**
Crossover is analogous to reproduction and biological crossover, upon which genetic algorithms are based.
The second step in the genetic manipulation process is termed as *mutation*.

**Mutation Operator:**

In mutation, the bits at one or more randomly selected positions of the chromosomes are altered. The mutation process helps to overcome trapping at local maxima. The off springs produced by the genetic manipulation process are the next population to be evaluated.
DATA DESIGN

Data Flow Diagram:
Level 0 DFD :-

[Data Flow Diagram Image]

- PLAYERS
- CRICKET TEAM SELECTION 0
  - INPUTS
  - TEAM
- PLAYER RECORDS
- PREDICTED SCORE
- SELECTOR
Level 1 DFD :-

- PLAYRES
- BEST SQUAD SELECTION 1
- SELECTOR
- PLAYER RECORDS
- SCORE PREDICTION 2
- PREDICTED SCORE
Level 2 DFD :-

1. INPUT ACCEPN 1.1
2. RANDOM PLAYER SELECTION 1.2
3. EVALUATION OF FITNESS 1.3
4. SELECTION OF PARENT (ROULET WHEEL) 1.4
5. ELITISM 30-40% 1.5
6. IF DUPLICATE
7. 2 POINT CROSSOVER 1.6
8. MUTATION (ALL ROUNDER/NEW PLAYER) 1.6
DATABASE

Ideal EER diagram :-

PLAYER

NAME

FNAME

LNAME

AGE

PID

DID

FIELDING

1DAY

TEST

1DAY

T20

TYPE

BATSMAN

TYPE=BAT

BTYPE

1DAY

TEST

T20

Bowler

TYPE=BOWL

WTYP

1DAY

TEST

T20

WK
Decomposed EER Diagram

PLAYER

PID = 1

1DAY
TEST-INS
T20
FIELDING

NAME
LNAME
AGE
M.
FNAME

D

N
2
ACTIVITY DIAGRAM

1. Accept input criteria
2. Generation of chromosome by random
3. Fitness evaluation
4. Threshold reached?
   - Yes: End
   - No: Selection of parent (roulette wheel)
5. Elitism
6. 2-point crossover
7. Duplicates?
   - Yes: Mutation (new players)
   - No: End
Genetic Algorithm:
The following algorithm is the basic Genetic Algorithm on which the system works. The algorithm works iteratively and moves towards the best solution.

1. Start
2. Generate the population of chromosomes
3. Calculate the fitness of each chromosome
4. Perform 'crossover'
5. Perform 'mutation'
6. Repeat steps 3 to 7 till desired fitness is achieved
7. End

=> Algorithm to perform crossover
1. Start
2. Select the two chromosomes using ‘roulette-wheel’ selection
3. Perform one point crossover
4. End
Algorithm to perform mutation
1. Start
2. Select the gene to be mutated
3. Perform mutation
4. End

Algorithm for ‘roulette-wheel’ selection
1. Start
2. Calculate the sum (S) of the fitness of all chromosome for a particular population
3. Generate a random number (r) between (0-S).
4. Go through the entire population and sum fitness’s and select the chromosome when s>r
5. Stop
**Fitness Functions:**

Since each player needs to be evaluated based on the role he plays in the team, the varied fitness calculation mechanisms are described as follows:

**Opening batsman:**
1. The batting parameters \( \text{AVG}, \ \text{STR}, \ \text{EXP}, \ \text{PF}, \ I \) (Ability to play long innings), \( \text{MW} \) (Match winning ability) have to fall within the range \((a, b)\) where ‘a’ and ‘b’ are pre-determined range limits.
2. \( \text{AVG} \) and \( \text{STR} \) of the past ten innings of the batsman is calculated and checked against a pre-determined set of values to evaluate his current form.

**Middle-order batsmen:**
1. The batting parameters \( \text{AVG}, \ \text{STR}, \ \text{EXP}, \ \text{PF}, \ I \) (Ability to play long innings), \( \text{MW} \) (Match winning ability) have to fall within the range \((a, b)\) where ‘a’ and ‘b’ are pre-determined range limits.
2. \( \text{AVG} \) and \( \text{STR} \) of the past ten innings of the batsman is calculated and checked against a pre-determined set of values to evaluate his current form.
3. The six hitting ability \( \text{SHA} \) of the batsman is calculated as follows: Total number of sixes hit by the batsman/ Total number of matches played. Higher value of \( \text{SHA} \) is given higher precedence.
4. A batsman is classified as an all rounder if and only if he has scored runs more than ‘\( R \)’ and taken wickets more than ‘\( W \)’ where \( R \) and \( W \) are fixed values chosen to ascertain the batsman’s merit.
Bowler:
1. The bowling parameters ECO, WPM, EXP, STR have to fall within the range (a, b) where ‘a’ and ‘b’ are pre-determined range limits.
2. Based on the match conditions and opposition, the bowling style (STYLE) and type (TYPE) of a bowler are given special credits which are given due importance in the selection procedure.
SOFTWARE SPECIFICATIONS

Database platform: MySQL

Connectivity platform: HeidiSQL

Implementation platform: Java