Contents

Chapter 1

Package ga

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Classes

1.1 Class GranDTFitnessFunction

1.1.1 Declaration

```
public class GranDTFitnessFunction
 extends FitnessFunction
```

1.1.2 Constructor summary

GranDTFitnessFunction(TeamConfiguration, PlayersCatalogue) Class constructor.

1.1.3 Method summary

evaluate(IChromosome) Determines the fitness for any given chromosome

1.1.4 Constructors

- **GranDTFitnessFunction**

```
public GranDTFitnessFunction(model.TeamConfiguration team,model.
    PlayersCatalogue catalogue)
```

  - **Description**

    Class constructor.

  - **Parameters**
    - `team` – A given team configuration
    - `catalogue` – A given players catalogue.

1.1.5 Methods

- **evaluate**

  ```
  protected double evaluate(IChromosome c)
  ```

  - **Description**
    Determines the fitness for any given chromosome
  - **Parameters**
    - `c` – A given chromosome
  - **Returns** – A value expressing the fitness of the given chromosome.

1.2 Class TeamGenerator

1.2.1 Declaration

```
public class TeamGenerator
 extends java.lang.Object
```

1.2.2 Constructor summary

TeamGenerator(Path) Creates the team generator receiving as a parameter the catalogue of players.

1.2.3 Method summary

chromosomeToTeam(IChromosome, TeamConfiguration, PlayersCatalogue) Parses and converts a chromosome into a list of players (a team).
generateTeam() Generates a near-optimal team using a genetic algorithm.
setTeamConfiguration(TeamConfiguration) Class setter.

1.2.4 Constructors

- **TeamGenerator**

  ```
  public TeamGenerator(java.nio.file.Path resourceDirectory)
  ```

  - **Description**
    Creates the team generator receiving as a parameter the catalogue of players. The catalogue of players comes in an excel sheet.

- **Parameters**
  - `resourceDirectory` – is the name of the excel file containing the players' catalogue.

1.2.5 Methods

- **chromosomeToTeam**

```
public static java.util.List chromosomeToTeam(IChromosome c,
    model.TeamConfiguration config,model.PlayersCatalogue
    catalogue)
```

  - **Description**
    Parses and converts a chromosome into a list of players (a team).
  - **Parameters**
    - `c` – A given chromosome.
    - `config` – The given team configuration.
    - `catalogue` – The given players catalogue.
  - **Returns** – A list of players given by the chromosome c.

- **generateTeam**

```
public java.util.List generateTeam() throws
    InvalidConfigurationException
```

  - **Description**
    Generates a near-optimal team using a genetic algorithm.
  - **Returns** – the generated team, as a list of players
  - **Throws**
    - `InvalidConfigurationException` – when called on an invalid configuration (JGAP).

- **setTeamConfiguration**

```
public void setTeamConfiguration(model.TeamConfiguration
    newConfiguration)
```

  - **Description**
    Class setter.
  - **Parameters**
    - `newConfiguration` – The given configuration to be set.

Chapter 2

Package model

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Classes

2.1 Class Player

Captures the information of a player.

2.1.1 Declaration

```
public class Player
 extends java.lang.Object
```

2.1.2 Constructor summary

Player(Row)

Player(String, String, Position, double, double) Default constructor for Player class.

2.1.3 Method summary

getClub()

getName()

getPosition()

getScore()

getValue()
setClub(String)
setName(String)
setPosition(Position)
setScore(int)
setValue(int)

2.1.4 Constructors

- **Player**

  ```
  public Player(Row row)
  ```

- **Player**

  ```
  public Player(java.lang.String name,java.lang.String club,
      Position position,double value,double score)
  ```

  - **Description**

    Default constructor for Player class.
  - **Parameters**
    - `name` – is the name of the player.
    - `club` – is the club of the player.
    - `position` – is the position of the player.
    - `value` – is the value of the player.
    - `score` – is the estimated score of the player.

2.1.5 Methods

- **getClub**

  ```
  public java.lang.String getClub()
  ```

  - **Returns** – the club

- **getName**

  ```
  public java.lang.String getName()
  ```

  - **Returns** – the name

- **getPosition**

```
public Position getPosition()
```

  - **Returns** – the position

- **getScore**

```
public double getScore()
```

  - **Returns** – the score

- **getValue**

```
public double getValue()
```

  - **Returns** – the value

- **setClub**

```
public void setClub(java.lang.String club)
```

  - **Parameters**
    - `club` – the club to set

- **setName**

```
public void setName(java.lang.String name)
```

  - **Parameters**
    - `name` – the name to set

- **setPosition**

```
public void setPosition(Position position)
```

  - **Parameters**
    - `position` – the position to set

- **setScore**

```
public void setScore(int score)
```

  - **Parameters**

    - `score` – the score to set

- **setValue**

  ```
  public void setValue(int value)
  ```

  - **Parameters**
    - `value` – the value to set

2.2 Class PlayersCatalogue

Catalogue of players.

2.2.1 Declaration

```
public class PlayersCatalogue
 extends java.lang.Object
```

2.2.2 Field summary

defenders
goalkeepers
midfielders
strikers

2.2.3 Constructor summary

PlayersCatalogue(Path) Creates a catalogue from an excel file.

2.2.4 Method summary

getDefender(int) Returns the ith defender in the catalogue
getGoalkeeper(int) Returns the ith goalkeeper in the catalogue
getMidfielder(int) Returns the ith midfielder in the catalogue
getStriker(int) Returns the ith striker in the catalogue
numDefenders() Returns the number of defenders in the catalogue
numGoalkeepers() Returns the number of goalkeepers in the catalogue
numMidfielders() Returns the number of midfielders in the catalogue
numStrikers() Returns the number of strikers in the catalogue

2.2.5 Fields

- `public java.util.List` **goalkeepers**

- `public java.util.List` **defenders**

- `public java.util.List` **midfielders**

- `public java.util.List` **strikers**

2.2.6 Constructors

- **PlayersCatalogue**

```
public PlayersCatalogue(java.nio.file.Path resourceDirectory)
    throws java.io.IOException
```

  - **Description**
    Creates a catalogue from an excel file.
  - **Parameters**
    * `resourceDirectory` – is the file name of the excel file containing the catalogue.
  - **Throws**
    * `java.io.IOException` –

2.2.7 Methods

- **getDefender**

```
public Player getDefender(int i)
```

  - **Description**
    Returns the ith defender in the catalogue
  - **Parameters**
    * `i` – is the index of the defender
  - **Returns** – the ith defender.

- **getGoalkeeper**

```
public Player getGoalkeeper(int i)
```

  - **Description**
    Returns the ith goalkeeper in the catalogue
  - **Parameters**
    * `i` – is the index of the goalkeeper
  - **Returns** – the ith goalkeeper.

- **getMidfielder**

```
public Player getMidfielder(int i)
```

  - **Description**
    Returns the ith midfielder in the catalogue

  - **Parameters**
    - `i` – is the index of the midfielder
  - **Returns** – the ith midfielder.

- **getStriker**

  ```
  public Player getStriker(int i)
  ```

  - **Description**
    Returns the ith striker in the catalogue
  - **Parameters**
    - `i` – is the index of the striker
  - **Returns** – the ith striker.

- **numDefenders**

  ```
  public int numDefenders()
  ```

  - **Description**
    Returns the number of defenders in the catalogue
  - **Returns** – the number of defenders in the catalogue

- **numGoalkeepers**

  ```
  public int numGoalkeepers()
  ```

  - **Description**
    Returns the number of goalkeepers in the catalogue
  - **Returns** – the number of goalkeepers in the catalogue

- **numMidfielders**

  ```
  public int numMidfielders()
  ```

  - **Description**
    Returns the number of midfielders in the catalogue
  - **Returns** – the number of midfielders in the catalogue

- **numStrikers**

  ```
  public int numStrikers()
  ```

  - **Description**
    Returns the number of strikers in the catalogue
  - **Returns** – the number of strikers in the catalogue

2.3 Class Position

Captures the positions of a player. Positions correspond to those used in GRAN DT list of player. These are: ARQ: goalkeeper DEF: defender VOL: midfielder DEL: striker.

2.3.1 Declaration

```
public final class Position
 extends java.lang.Enum
```

2.3.2 Field summary

ARQ
DEF
DEL
VOL

2.3.3 Method summary

valueOf(String)
values()

2.3.4 Fields

- public static final Position **ARQ**
- public static final Position **DEF**
- public static final Position **VOL**
- public static final Position **DEL**

2.3.5 Methods

- **valueOf**

```
public static Position valueOf(java.lang.String name)
```

- **values**

```
public static Position[] values()
```

2.3.6 Members inherited from class Enum

java.lang.Enum

- protected final Object **clone**() throws CloneNotSupportedException
- public final int **compareTo**(Enum **arg0**)
- public final Optional **describeConstable**()
- public final boolean **equals**(Object **arg0**)

- `protected final void` **finalize**`()`
- `public final Class` **getDeclaringClass**`()`
- `public final int` **hashCode**`()`
- `public final String` **name**`()`
- `public final int` **ordinal**`()`
- `public String` **toString**`()`
- `public static Enum` **valueOf**`(Class` **arg0**`, String` **arg1**`)`

2.4 Class TeamConfiguration

Captures a team configuration, including the budget, team size and formation.

2.4.1 Declaration

```
public class TeamConfiguration
 extends java.lang.Object
```

2.4.2 Constructor summary

TeamConfiguration() Default team configuration constructor.
TeamConfiguration(int, int, int, int, int) Constructor that receives budget, team size and number of players.

2.4.3 Method summary

getBudget()
getDefenders()
getGoalkeepers()
getMidfielders()
getStrikers()
getTeamSize()
isValidTeam(List) Checks whether a list of players is a valid team.
setBudget(int)
setDefenders(int)
setGoalkeepers(int)
setMidfielders(int)
setStrikers(int)
setTeamSize(int)

2.4.4 Constructors

- **TeamConfiguration**

  ```
  public TeamConfiguration()
  ```

  - **Description**
    Default team configuration constructor. It sets budget to 65000000, team size to 15, and formation to 1-4-3-3 with one substitution per position.

- **TeamConfiguration**

  ```
  public TeamConfiguration(int budget,int goalkeepers,int
      defenders,int midfielders,int strikers)
  ```

  - **Description**
    Constructor that receives budget, team size and number of players.
  - **Parameters**
    - `budget` –
    - `goalkeepers` –
    - `defenders` –
    - `midfielders` –
    - `strikers` –

2.4.5 Methods

- **getBudget**

  ```
  public int getBudget()
  ```

  - **Returns** – the budget

- **getDefenders**

  ```
  public int getDefenders()
  ```

  - **Returns** – the defenders

- **getGoalkeepers**

  ```
  public int getGoalkeepers()
  ```

  - **Returns** – the goalkeepers

- **getMidfielders**

  ```
  public int getMidfielders()
  ```

  - **Returns** – the midfielders

- **getStrikers**

```
public int getStrikers()
```

  - **Returns** – the strikers

- **getTeamSize**

```
public int getTeamSize()
```

  - **Returns** – the teamSize

- **isValidTeam**

```
public boolean isValidTeam(java.util.List team)
```

  - **Description**
    Checks whether a list of players is a valid team.
  - **Parameters**
    - `team` – is the list of players to be checked.
  - **Returns** – true iff the team is valid, i.e., satisfies formation and is within budget.

- **setBudget**

```
public void setBudget(int budget)
```

  - **Parameters**
    - `budget` – the budget to set

- **setDefenders**

```
public void setDefenders(int defenders)
```

  - **Parameters**
    - `defenders` – the defenders to set

- **setGoalkeepers**

```
public void setGoalkeepers(int goalkeepers)
```

  - **Parameters**
    - `goalkeepers` – the goalkeepers to set

- **setMidfielders**

  ```
  public void setMidfielders(int midfielders)
  ```

  - **Parameters**
    - `midfielders` – the midfielders to set

- **setStrikers**

  ```
  public void setStrikers(int strikers)
  ```

  - **Parameters**
    - `strikers` – the strikers to set

- **setTeamSize**

  ```
  public void setTeamSize(int teamSize)
  ```

  - **Parameters**
    - `teamSize` – the teamSize to set