1- We define three elements that will guide the algorithm in its searching toward the best class and the best exampler

2- the first element is the adjancecy matrix AM which ranks the particles according to their fitness values for each objective function, hence, it is combined of m raws and n colunms where m is the number of objective function and n in the number of particle

|  |  |  |  |
| --- | --- | --- | --- |
|  | P1 | … | pn |
| F1 |  |  |  |
| F2 |  |  |  |
| .. |  |  |  |
| Fm |  |  |  |

4- the second element is the reduced AM RAM, which ranks each class according to the maximum objective that is acheived by this class so far, it is composed of number of raws equal to m and number of columns equal to N'.

(AM,AM1,AM2 ..AMN', RAM)

AM1=

|  |  |  |  |
| --- | --- | --- | --- |
|  | P1 |  | Pn1 |
| F1 | F1 |  |  |
| .. |  |  |  |
| Fm |  |  |  |

AM2=

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pn1+1 |  | Pn1+n2 |
| F1 |  |  |  |
| .. |  |  |  |
| Fm |  |  |  |

…

AMCn’=

|  |  |  |  |
| --- | --- | --- | --- |
|  | Pn-n’+1 |  | Pn |
| F1 |  |  |  |
| .. |  |  |  |
| Fm |  |  |  |

3-the third element is the class AM matrices: AM1, AM2 ...AMN' where N' denotes the number of classes

|  |  |  |  |
| --- | --- | --- | --- |
|  | C1 | … | Cn’ |
| F1 |  |  |  |
| F2 |  |  |  |
| .. |  |  |  |
| Fm |  |  |  |

5-in each iteration of the algorithm, and for each particle of the particles, the algorithm has to select for it an examplor and to decide a new class for it (if needed).

for selecting an examplor, we use Roulette Wheel derived from probability density function based on AMi where i=1, 2....N' according to the current class of the particle

for selecting a new class, we use Roulette wheel derived from probability density function based on RAM

in both cases we have a seperated pdf according to the selected objective function, we select the objective using uniform distirbution

6- the new class selection is not done in every iteration, rather, it is done if the particle is not improving for pre-defined numebr of iterations