Detailed Pseudocode of the ABC Algorithm

1: Initialize the population of solutions $x_{i,j}$

2: Evaluate the population

3: cycle=1

4: repeat

5: Produce new solutions (food source positions) $\upsilon_{i,j}$ in the neighbourhood of $x_{i,j}$ for the employed bees using the formula $\upsilon_{i,j} = x_{i,j} + \Phi_{ij}(x_{i,j} - x_{k,j})$ (k is a solution in the neighbourhood of i, Φ is a random number in the range [-1,1])and evaluate them

6: Apply the greedy selection process between x_i and υ_i

7: Calculate the probability values P_i for the solutions x_i by means of their fitness values using the equation (1)

$$P_i = \frac{fit_i}{\sum_{i=1}^{SN} fit_i} \qquad (1)$$

In order to calculate the fitness values of solutions we employed the following equation (eq. 2):

$$fit_i = \begin{cases} \dfrac{1}{1+f_i} & if \ \ f_i \geq 0 \\ 1 + abs(f_i) & if \ \ f_i < 0 \end{cases} \qquad (2)$$

Normalize P_i values into [0,1]

8: Produce the new solutions (new positions) υ_i for the onlookers from the solutions x_i, selected depending on P_i, and evaluate them

9: Apply the greedy selection process for the onlookers between x_i and υ_i

10: Determine the abandoned solution (source), if exists, and replace it with a new randomly produced solution x_i for the scout using the equation (3)

$$x_{ij}=min_j+rand(0,1)*(max_j-min_j) \quad (3)$$

11: Memorize the best food source position (solution) achieved so far

12: cycle=cycle+1

13: until cycle= Maximum Cycle Number (MCN)