Artificial Bee Colony Algorithm for *DNA Fragment Assembly* Problem

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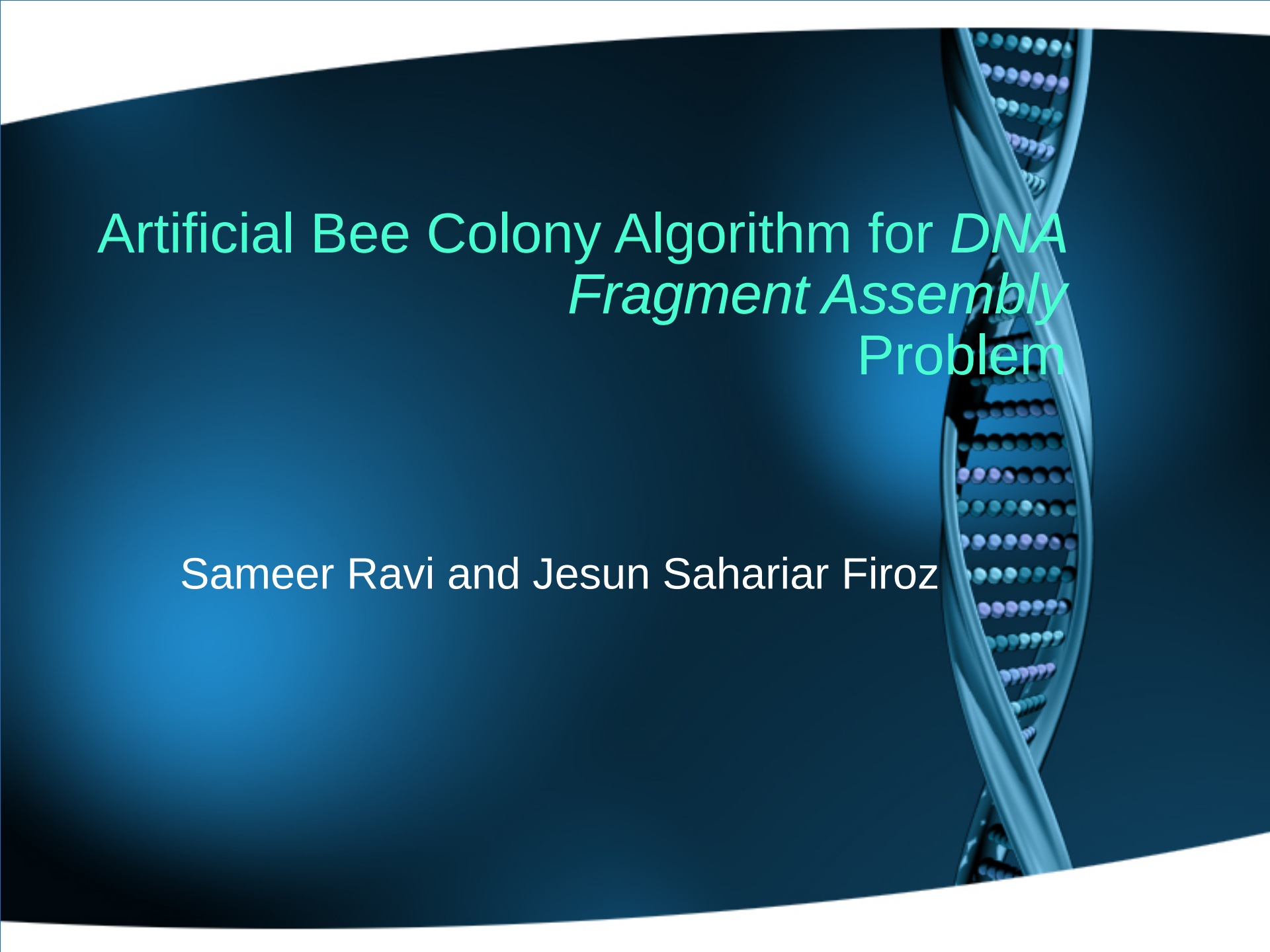
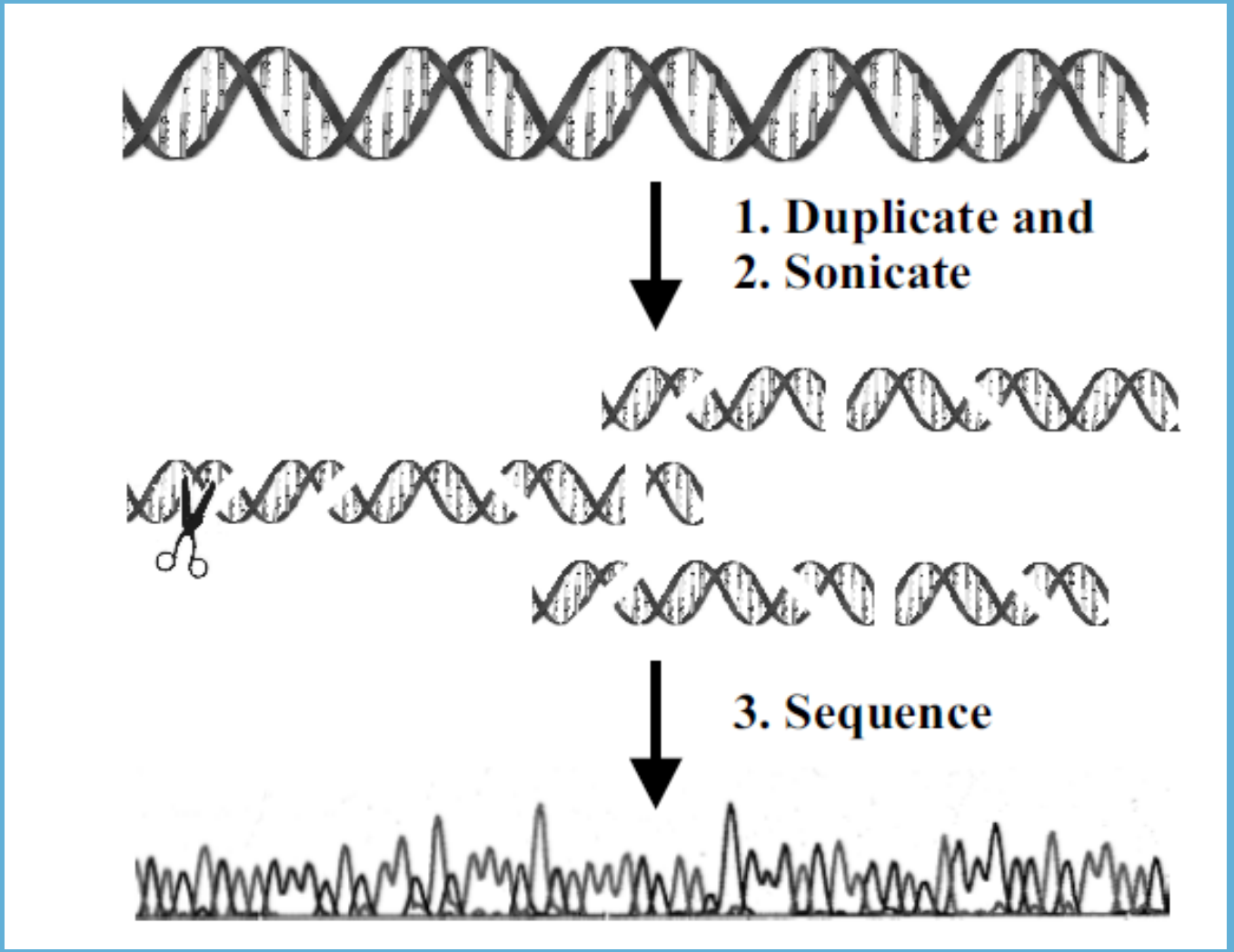


DNA Sequencing Process



DNA Sequencing Process (cont.)

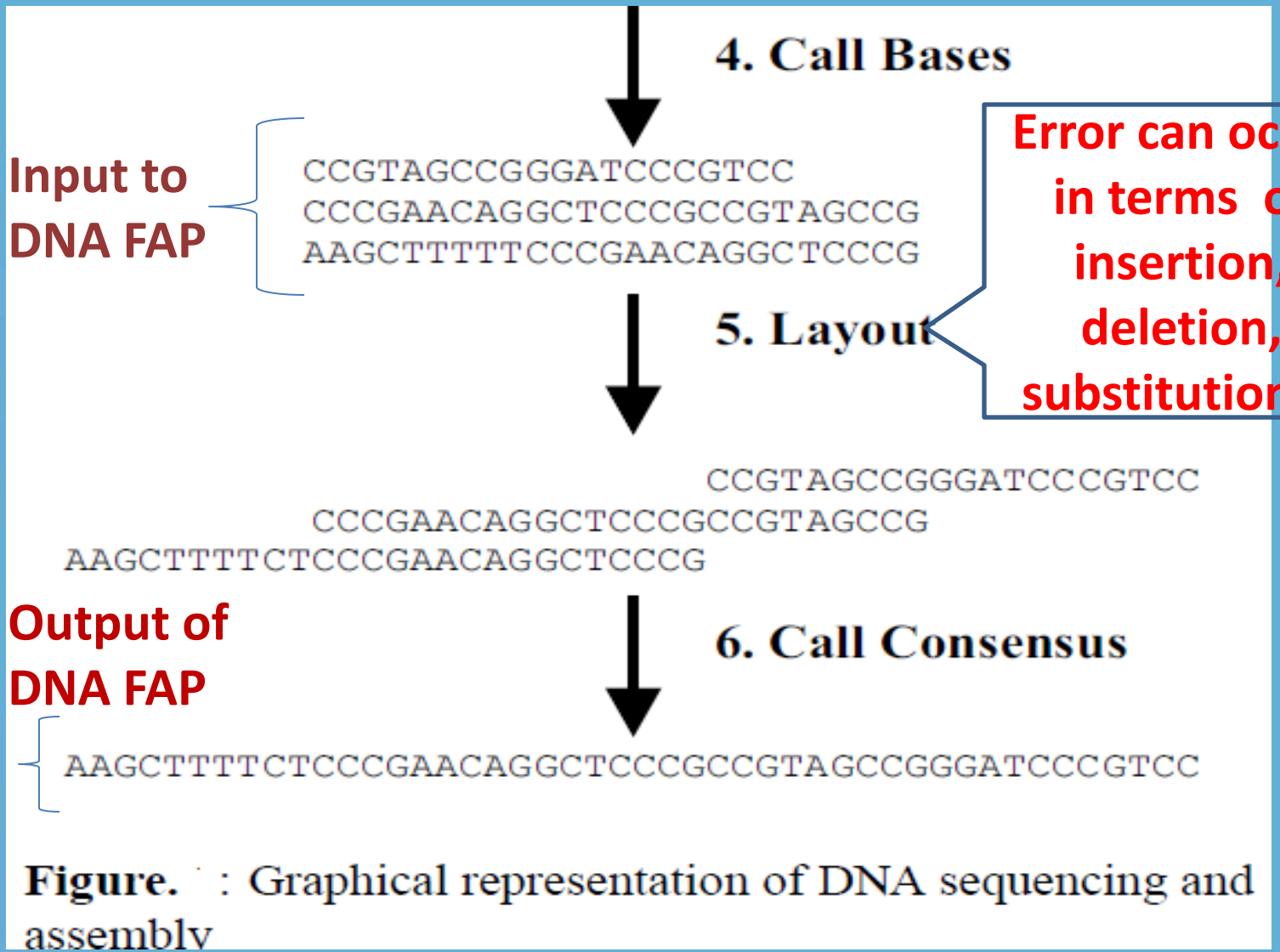


Figure. : Graphical representation of DNA sequencing and assembly

Artificial Bee colony Algorithm (ABC_FAP)

- Behavior of a Honey Bee Swarm:
  - ✓ Food Sources
  - ✓ Employed foragers
  - ✓ Unemployed foragers: scouts and onlookers

Artificial Bee colony Algorithm (ABC_FAP)

Algorithm 1 Generic ABC Algorithm

1: Initialize potential food sources for employed bees.
2: **while** Requirements are not met **do**
3: Each employed bee goes to a food source in her memory and determines a neighbour source, then evaluates its nectar amount and dances in the hive
4: Each onlooker watches the dance of employed bees and chooses one of their sources depending on the dances, and then goes to that source. After choosing a neighbour around that, she evaluates its nectar amount.
5: Abandoned food sources are determined and are replaced with the new food sources discovered by scouts.
6: The best food source found so far is registered
7: **end while**

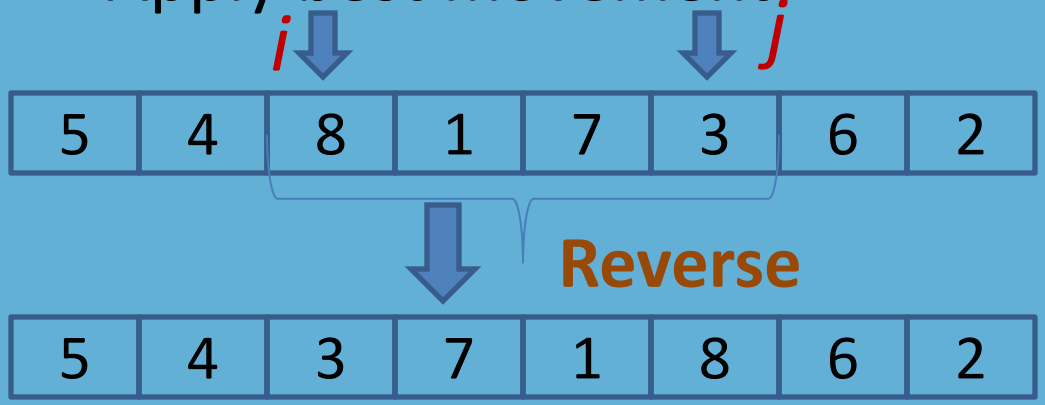
Artificial Bee colony Algorithm (ABC_FAP)

- Initialization:
  - ✓Food Source => A permutation of fragments
  - ✓ Generated randomly (No seeding technique involved)
- Calculate Fitness:
  - ✓ By summing up the overlap amount of consecutive fragments.

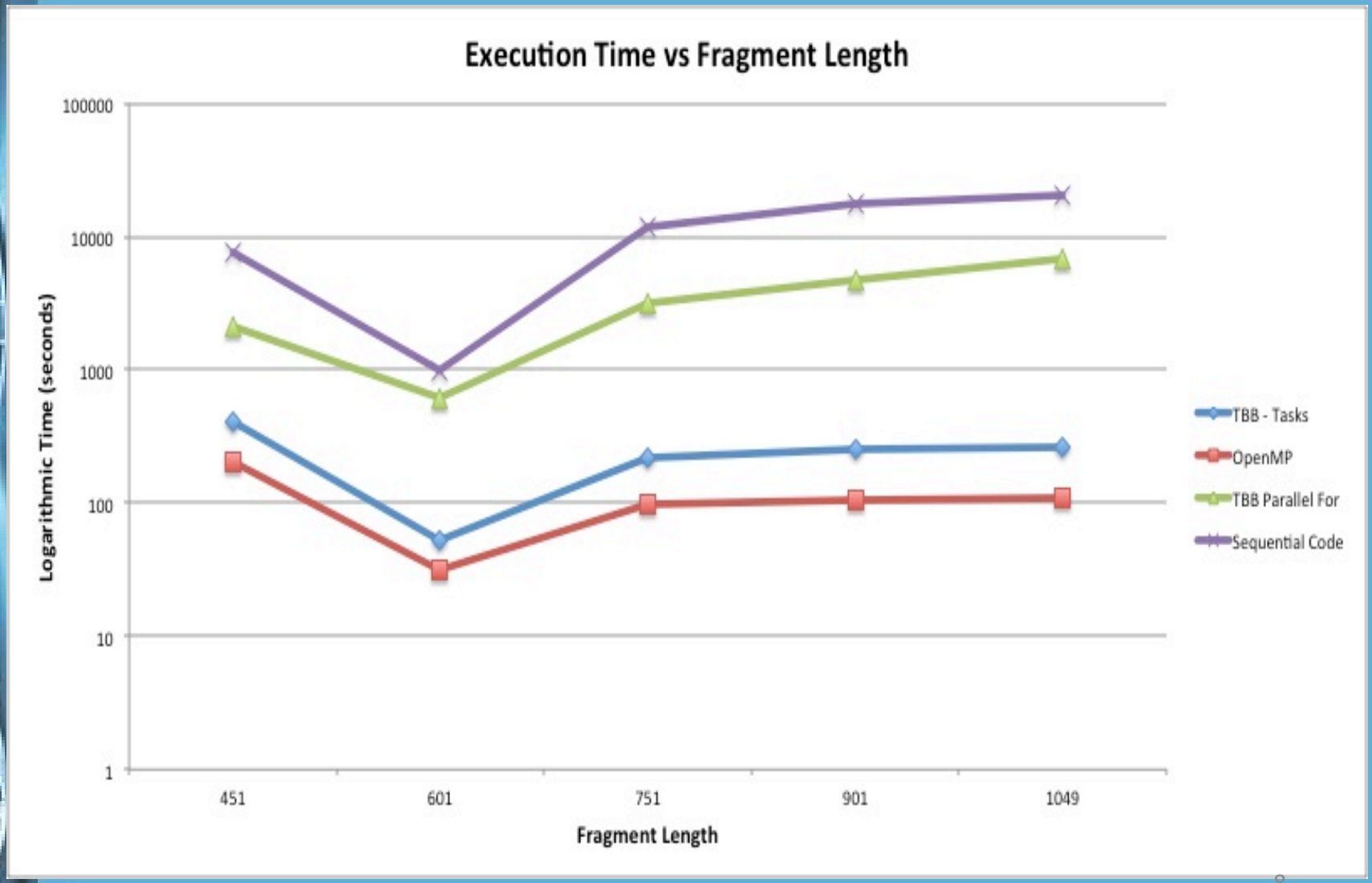
$$F_\mu = \sum_{i=0}^{n-2} w(f[i], f[i+1]),$$

Artificial Bee colony Algorithm (ABC_FAP)

- Memorize the best solution.
- Send Employer bees
  - ✓ Estimate nectar amount => evaluate fitness
  - ✓ Modify the solution using Problem aware local search (PALS).
  - ✓ Apply best movement



Experimental Results



Questions?