Algoritmos Genéticos

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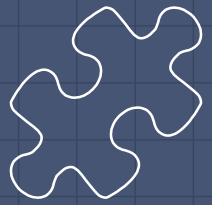
Sistemas de Inteligencia Artificial: TP2

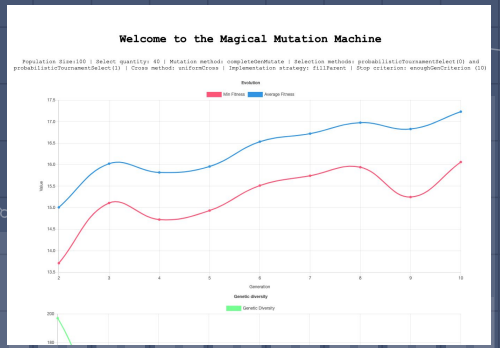
Estructura del proyecto

Código fuente escrito en Typescript



NPM + Webpack
(se genera un bundle.js)

Sitio estático
(Webpack-dev-server)



Base de prueba

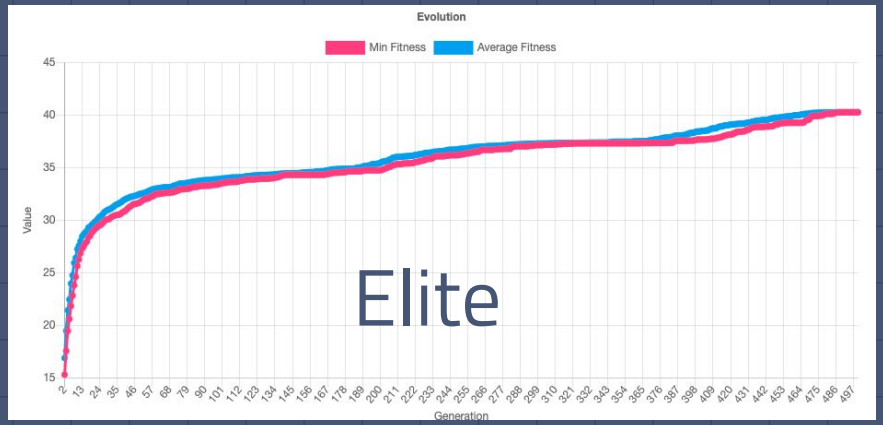
- Cruce: Uniforme
- Mutacion: Multigen Uniforme
- Implementacion: Fill-all
- Seleccion: Elite (100%)
- Corte: Cantidad de generaciones (500 gen)
- Tamaño de población: 300
- Cantidad de Padres: 50
- Probabilidad de mutación: 60%

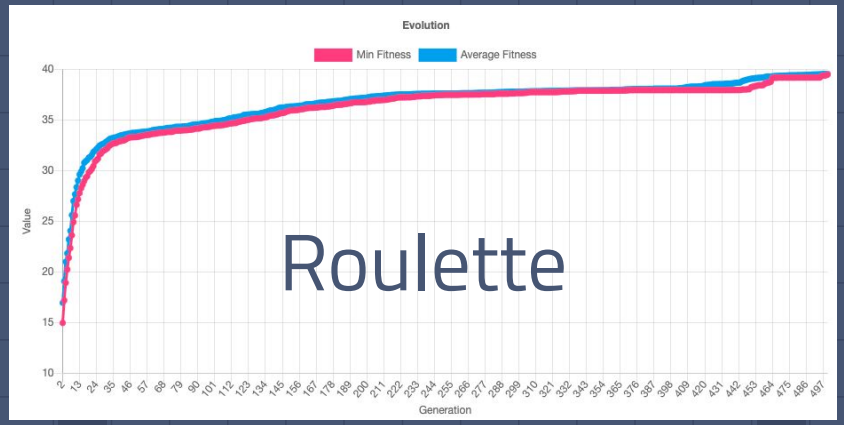
Métodos de selección 

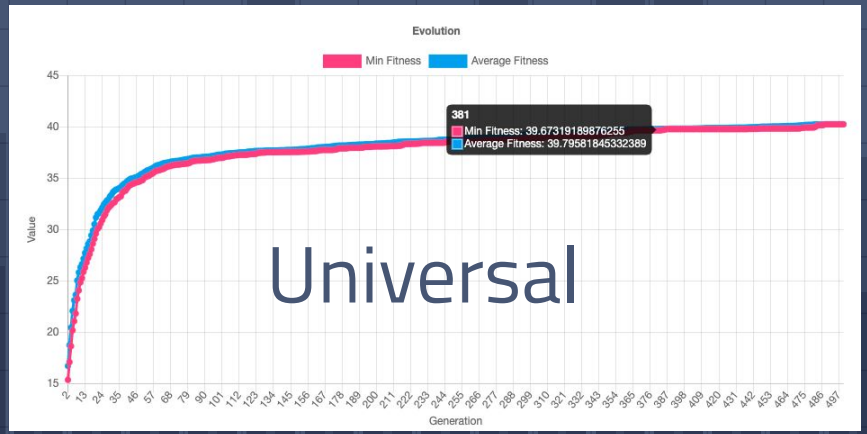
- Elite
- Ranking
- Roulette
- Tournament
- Probabilistic Tournament
- Boltzmann
- Universal

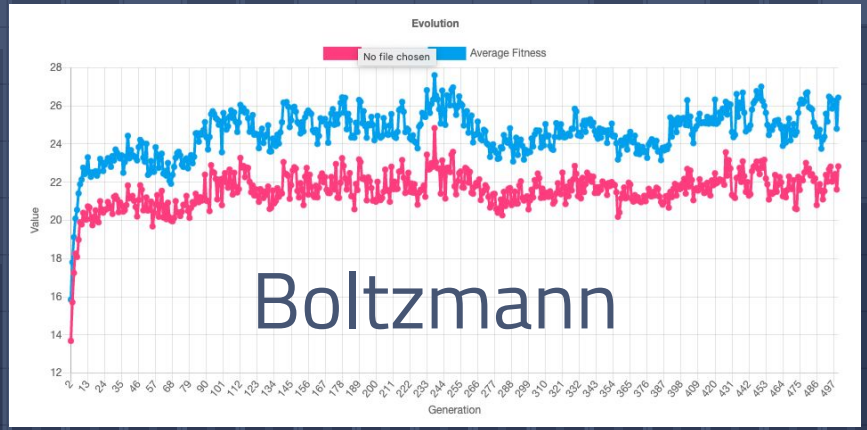
1

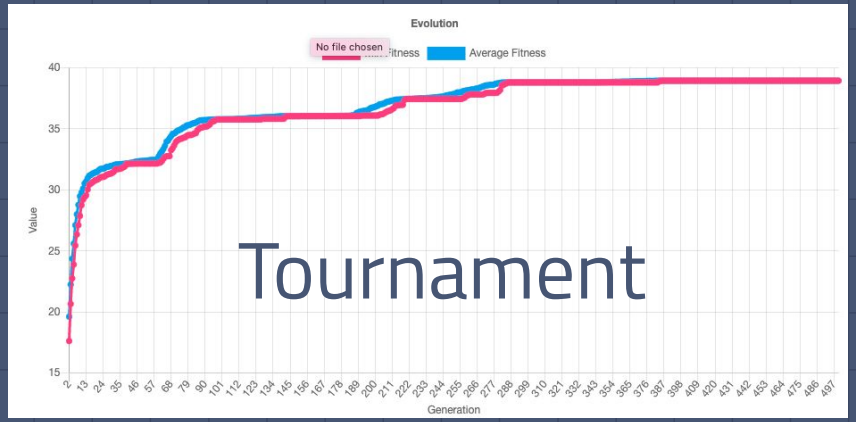
Aptitud


Evolution
Min Fitness
Average Fitness
Value
Generation
Elite


Evolution
Min Fitness
Average Fitness
Value
Generation
Roulette


Evolution
Min Fitness
Average Fitness
381
Min Fitness: 39.67319189876255
Average Fitness: 39.79581845332389
Value
Generation
Universal


Evolution
No file chosen
Average Fitness
Value
Generation
Boltzmann


Evolution
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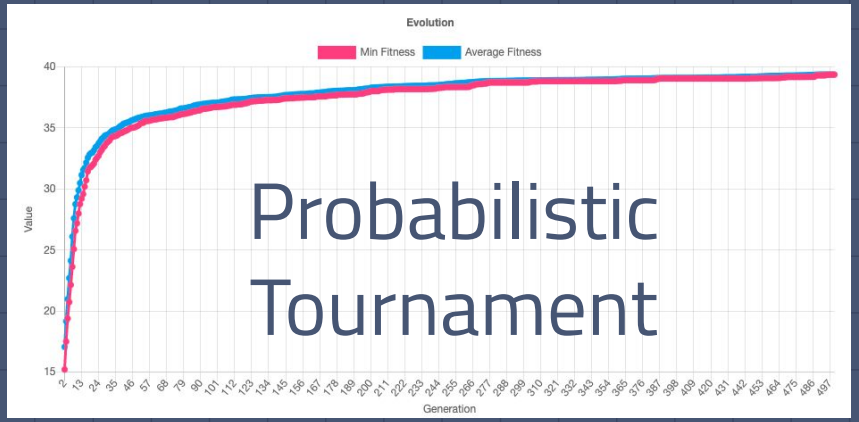
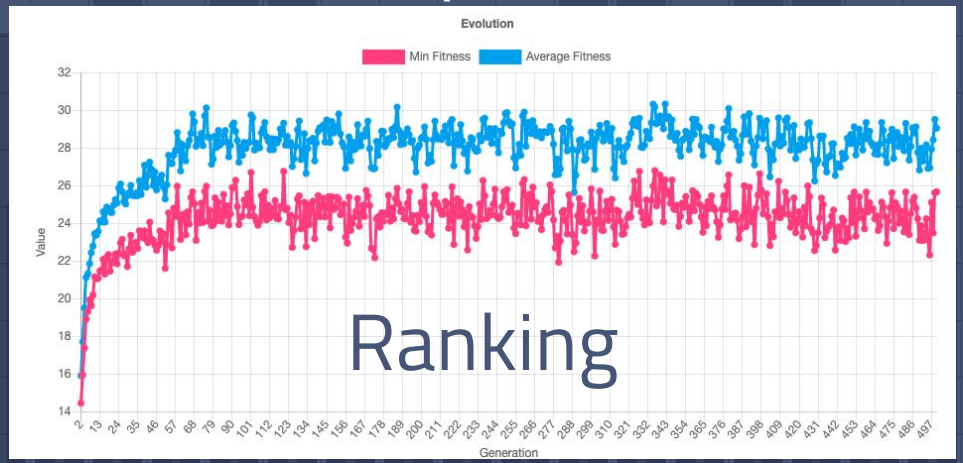
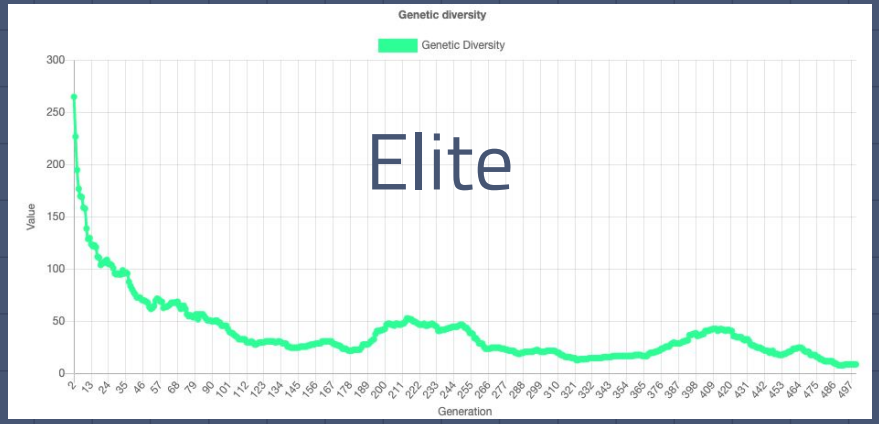
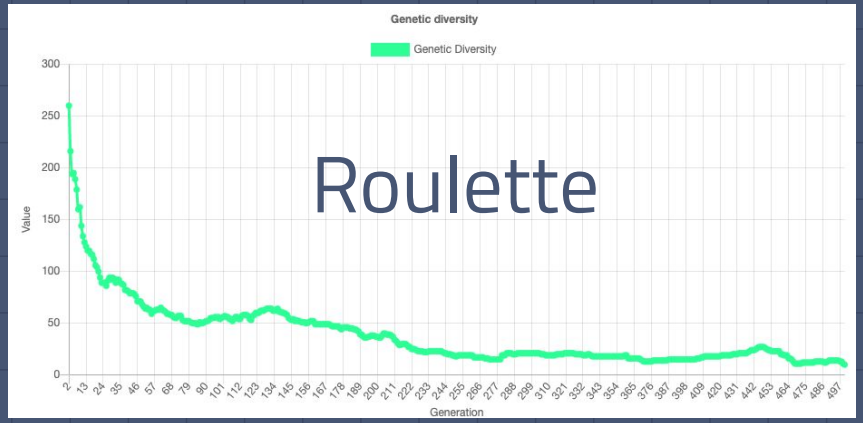
Average Fitness
Value
Generation
Tournament


Evolution
Min Fitness
Average Fitness
Value
Generation
Probabilistic
Tournament

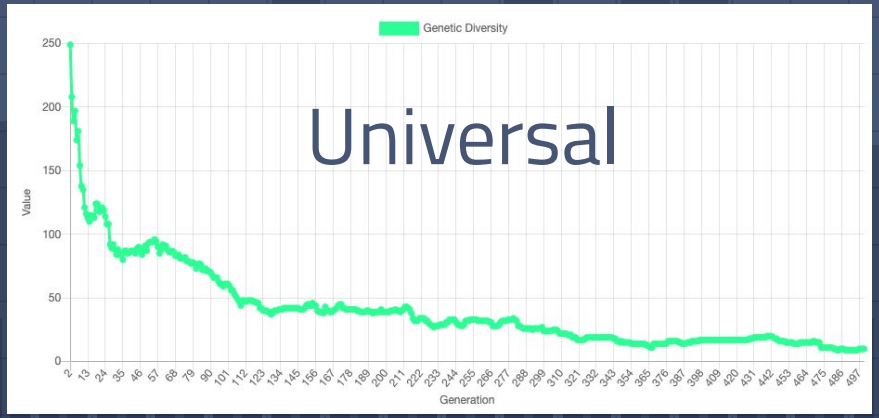
Aptitud

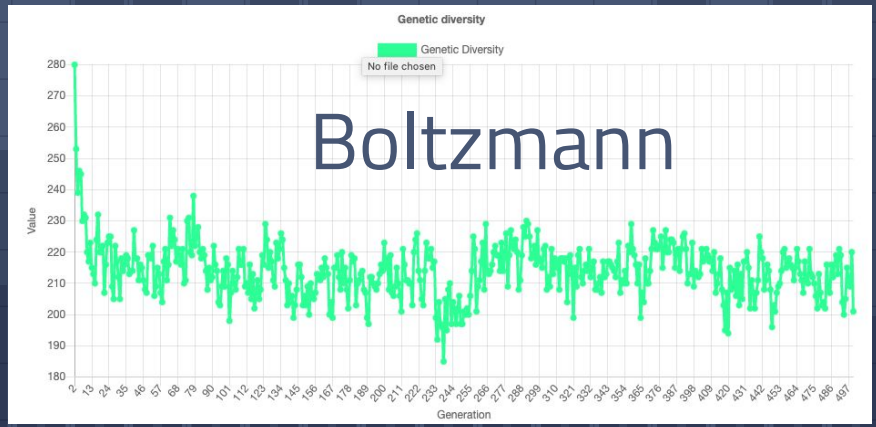

Evolution
Min Fitness
Average Fitness
Value
Generation
Ranking


Genetic diversity
Genetic Diversity
Elite
Value
Generation


Genetic diversity
Genetic Diversity
Roulette
Value
Generation

Diversidad


Genetic Diversity
Universal
Value
Generation


Genetic diversity
Genetic Diversity
No file chosen
Boltzmann
Value
Generation

Diversidad


Genetic diversity
Genetic Diversity
No file chosen
Tournament
Value
Generation

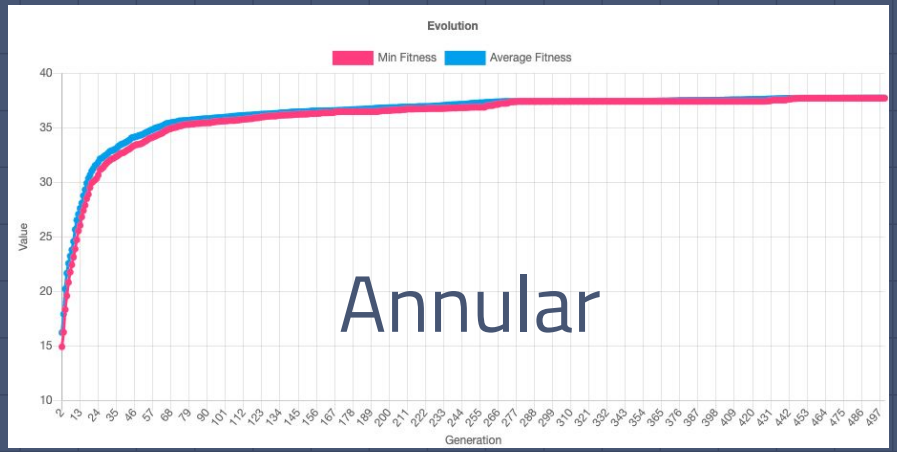

Genetic diversity
Genetic Diversity
Probabilistic Tournament
Value
Generation

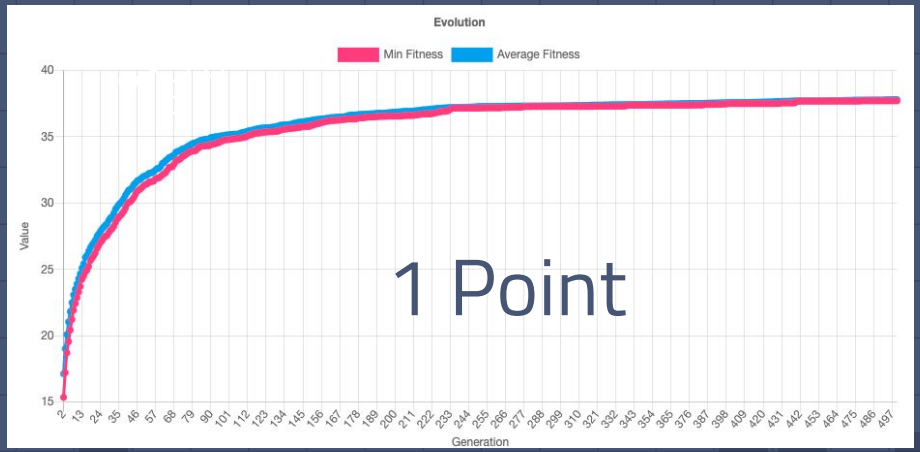

Genetic diversity
Genetic Diversity
Ranking
Value
Generation

Métodos de cruza 

- Annular
- Uniform
- 1 Point
- 2 Point

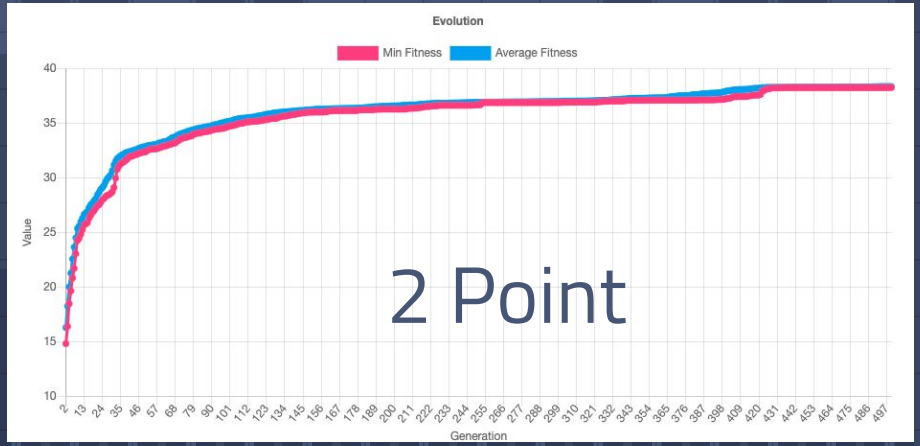
2

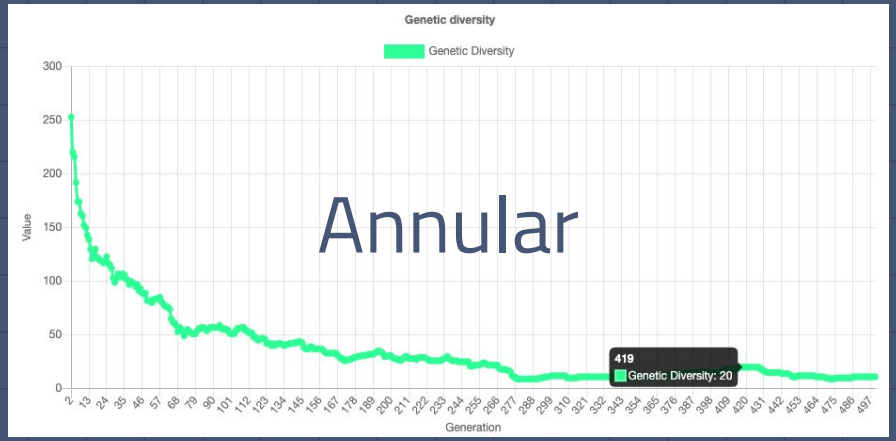

Evolution
Min Fitness
Average Fitness
Value
Generation
Annular


Evolution
Min Fitness
Average Fitness
Value
Generation
1 Point

Aptitud


Evolution
Min Fitness
Average Fitness
Value
Generation
Uniform


Evolution
Min Fitness
Average Fitness
Value
Generation
2 Point



Annular

1 Point

Diversidad

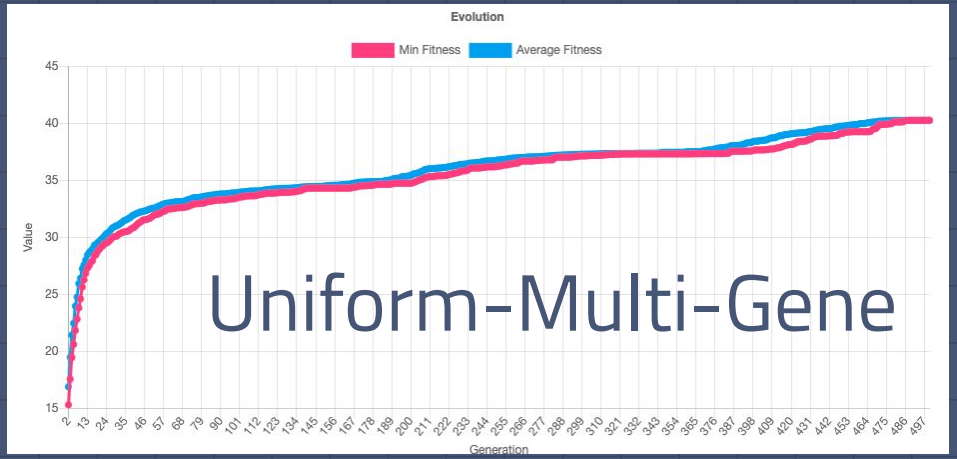
Uniform

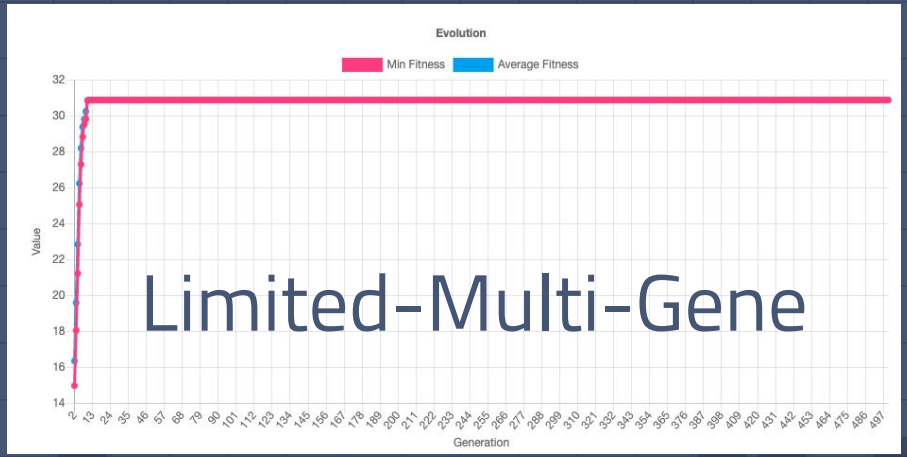
2 Point

Métodos de mutación 

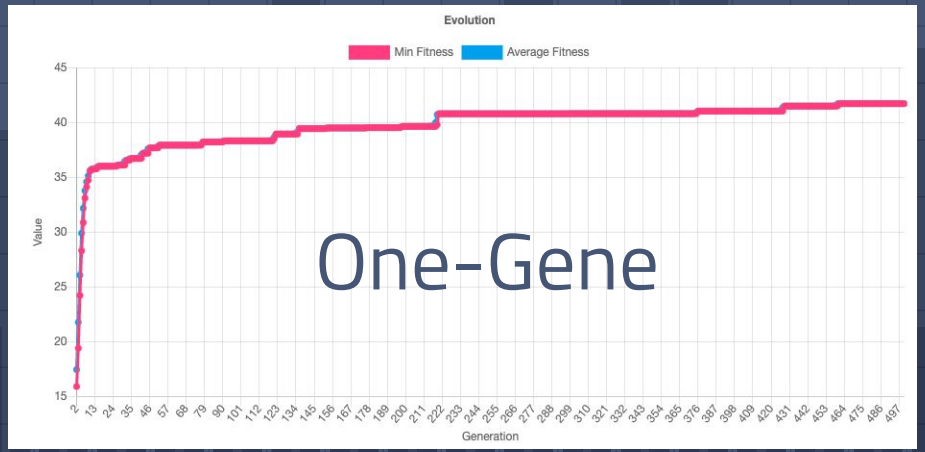
- Complete
- One-gene
- Uniform Multi-gene
- Limited Multi-gene

3

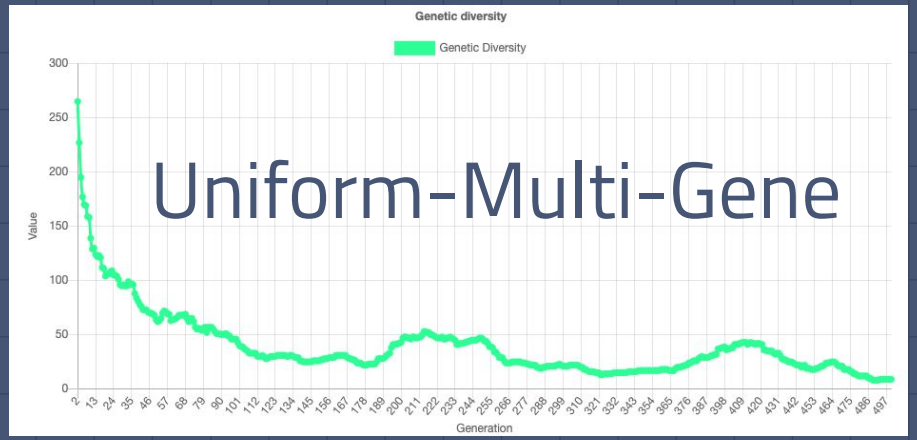

Evolution
Min Fitness
Average Fitness
Value
Generation
Uniform-Multi-Gene


Evolution
Min Fitness
Average Fitness
Value
Generation
Limited-Multi-Gene

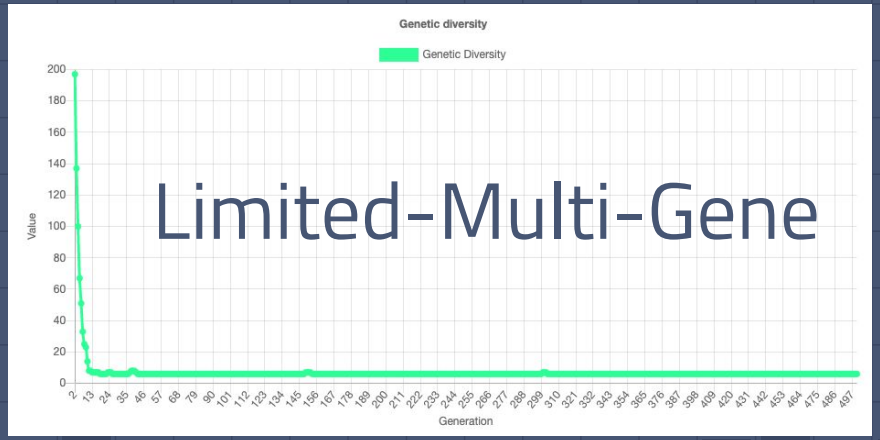
Aptitud


Evolution
Min Fitness
Average Fitness
Value
Generation
One-Gene


Evolution
Min Fitness
Average Fitness
Value
Generation
Complete

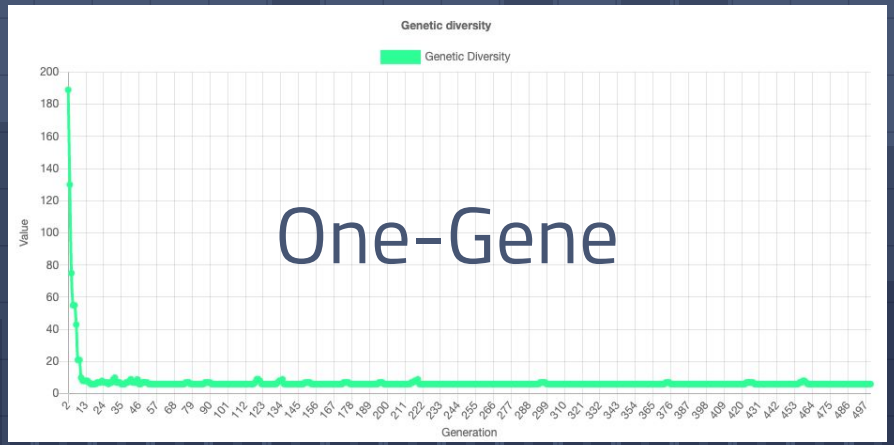


Uniform-Multi-Gene



Limited-Multi-Gene

Diversidad



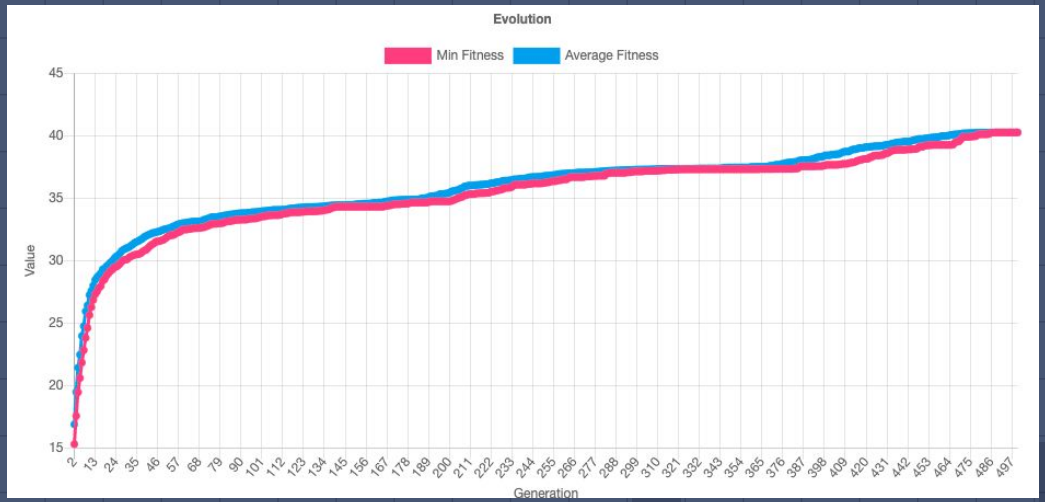
One-Gene

Complete

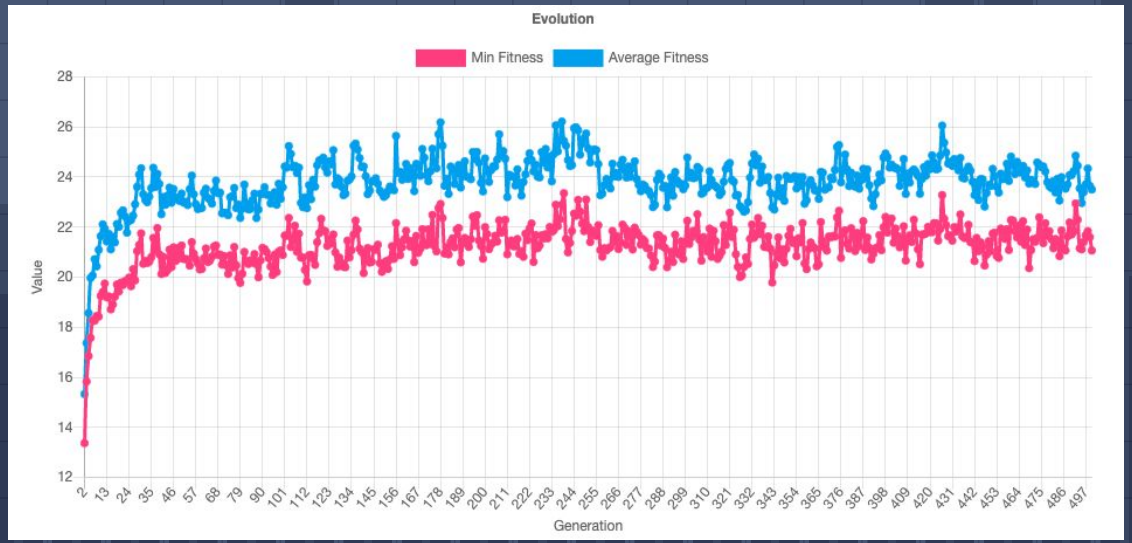
Métodos de implementación

- Fill-All
- Fill-Parent

4



Fill-All Aptitud



Fill-Parent Aptitud

GeneticEngineGeneticEngine

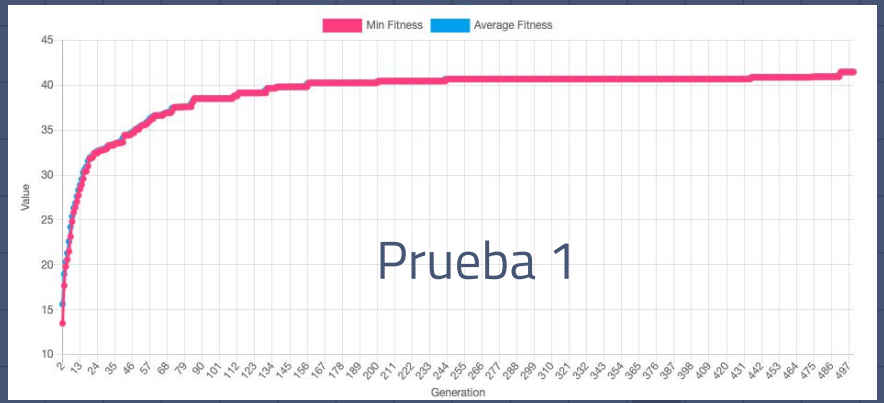
```
findBestConfig(allItems: AllItems): Configuration {
    const allConfigs: Configuration[] = this.generateAllConfigs();
    const geneticEngine: GeneticEngine = new GeneticEngine(allConfigs[0], allItems);
    let currentMaxApt = 0;
    let bestConfig = new Configuration();
    allConfigs.forEach((config) => {
      let maxApt = geneticEngine.quickEvolution(config).reduce((prev, curr) => curr.getAptitude()>prev?curr.getAptitude():prev, 0);
      for (let i = 0; i < 5; i++) {
        let newMax = geneticEngine.quickEvolution(config).reduce((prev, curr) => curr.getAptitude()>prev?curr.getAptitude():prev, 0);
        if (newMax > maxApt)
          maxApt = newMax;
      }
      if (maxApt > currentMaxApt){
        currentMaxApt = maxApt;
        bestConfig = config;
      }
    });
    return bestConfig;
  }
```

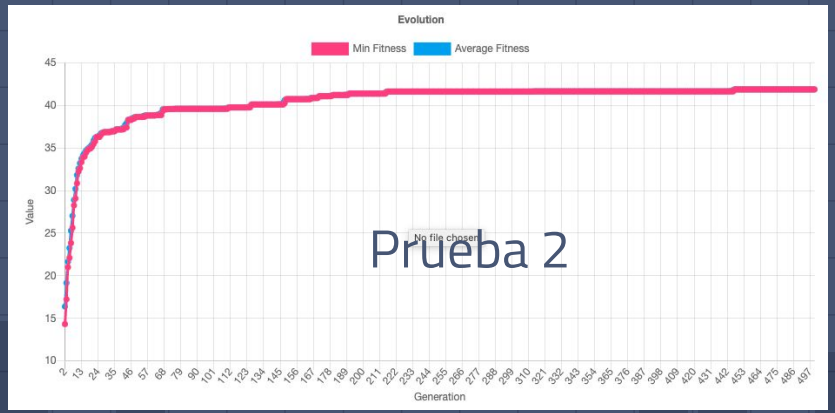
Conclusion

- Cruce: One-Point
- Mutacion: One-Gene
- Implementacion: Fill-all
- Seleccion: Boltzmann (100%)
- Corte: Cantidad de generaciones (500 gen)
- Tamaño de población: 300
- Cantidad de Padres: 50
- Probabilidad de mutación: 60%

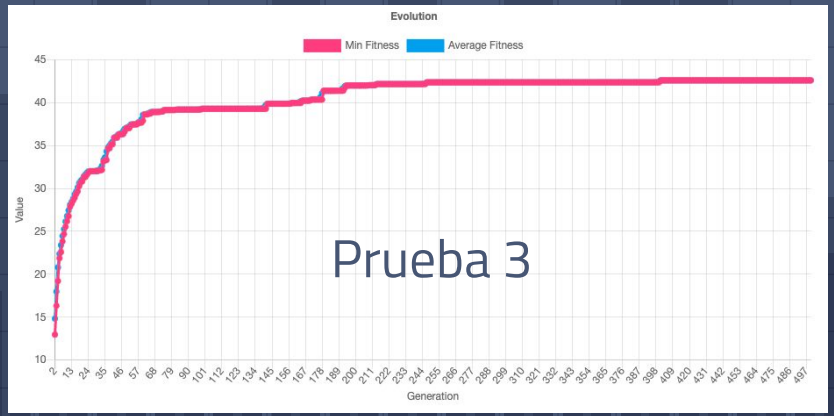
5

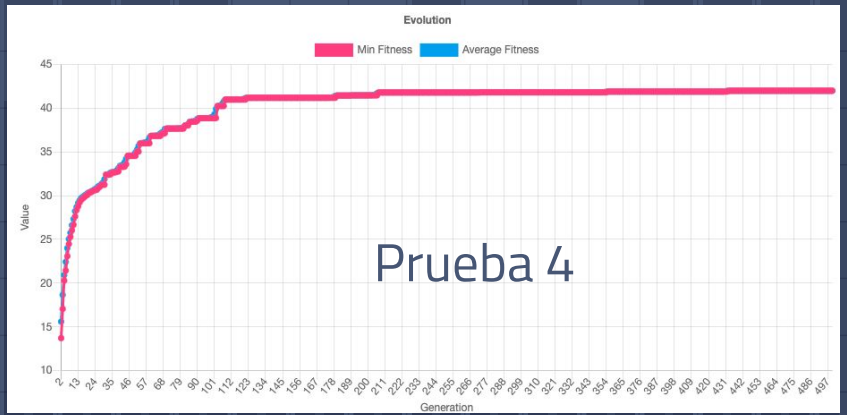
Resultados de la conclusión



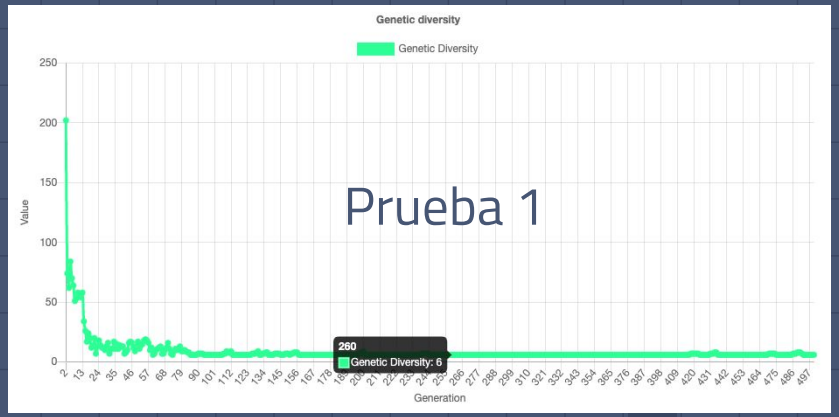


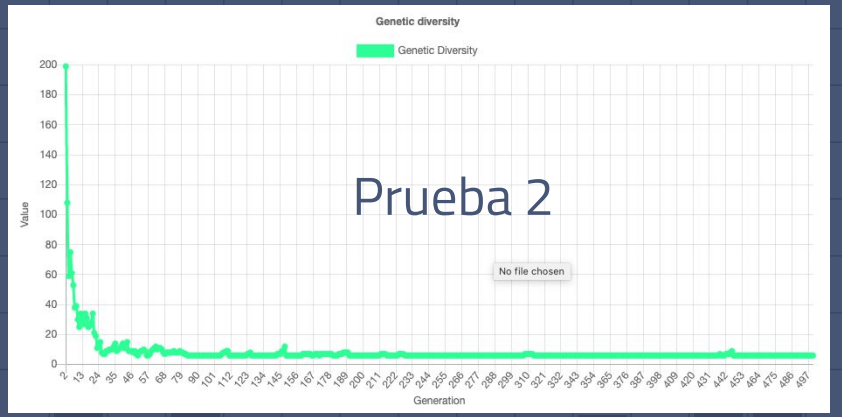
Aptitud



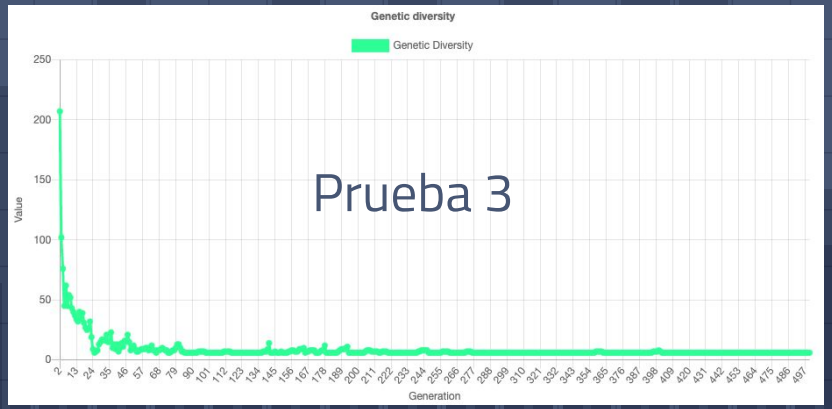


Resultados de la conclusión





Diversidad



Resultados de la conclusión

Mejor Resultado

Prueba 1

Prueba 2

Prueba 3

Prueba 4

Gracias!