NeuralNetsGeneticAlgorithms

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1 Genetic Algorithm evolving Neural Net

This notebook presents the performance of genetic algorithm that aims in evolving neural net's weights.

1.1 Dataset

Firstly, we need to prepare dataset.

In [5]:
```
from GANN import *

        n_cases = 1000
        height = 5
        width = 5
        placeholders_target = np.zeros((n_cases,height,width))
        placeholders_noise = np.zeros((n_cases,height,width))

        placeholders_target = np.array([create_instance(placeholders_target[n])
                                        for n in range(n_cases)])
        placeholders_noise = np.array([create_random_inst(placeholders_noise[n])
                                        for n in range(n_cases)])

        target = [[1,0] for n in range(n_cases)]
        noise = [[0,1] for n in range(n_cases)]

        dataset = np.vstack([placeholders_target,placeholders_noise])
        target = np.vstack([target,noise])
        dataset = dataset.reshape((n_cases*2,height*width))
```

1.2 Setting parameters

I am checking which initial number of population provides best results.

In [8]:
```
results = dict()
        for n in range(1,11):
            n = n * 100
            ga = GenAlWeightsNN(n_pop=n,max_gen=100)
```

```
        ga.fit(dataset,target)
        ga.transform()
        results[n] = (ga.best_ind,ga.validate())

    result_dict = pd.DataFrame(index = results.keys())
    result_dict['Accuracy on test'] = [round(n[0]*100,2) for n in results.values()]
    result_dict['Accuracy validate'] = [round(n[1],2) for n in results.values()]
    result_dict
```

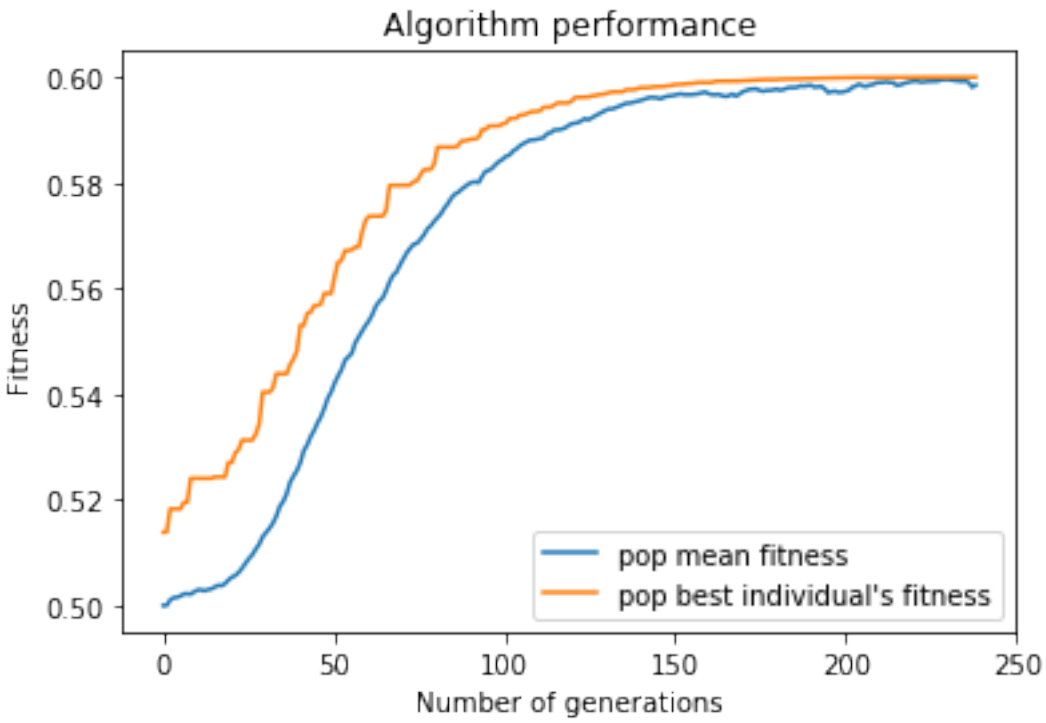
Out[8]:

	Accuracy on test	Accuracy validate
100	54.97	54.94
200	57.53	56.57
300	57.94	58.04
400	58.84	58.48
500	57.37	57.39
600	58.51	57.70
700	58.87	58.06
800	58.85	58.51
900	58.98	59.14
1000	59.38	59.01

2 The performance of algorithm

After testing some paramters I have found the fine parameters that allows for achieving best results. In purpose of maximazing the search space I used 1000 initial population.

```
In [7]: ga = GenAlWeightsNN(n_pop=1000,max_gen=250)
        ga.fit(dataset,target)
        ga.transform()
        ga.plot_fitness()
        print('Achieved accuracy:{}'.format(round(ga.best_ind*100,2)))
        print('Achieved accuracy on validate dataset:{}'.format(
            round(ga.validate(),2)))
```




```
Achieved accuracy:60.0
Achieved accuracy on validate dataset:60.18
```

2.1 Summary

Even though algorithm performed properly, it didn't allow for as good results as the backpropagation algorithm.

2.1.1 TO DO

Next thing to do is to adapt the algorithm so it evolves the architecture of neural nets.