

Genetic Algorithm

```
In [1]: import francium.algorithms.genetic_algorithm as ga
import francium.core.eval_functions as eval_functions
```

using an environment with $z = x^2 + y^2$

```
In [4]: agent = ga.Agent()
env = ga.Environment(x_bounds=(-5.0, 5.0), y_bounds=(-5.0, 5.0), eval_func=eval_functions.convex_x_square)
solver = ga.Solver(agent=agent, environment=env, pop_size=100)
```

```
In [5]: solver.init_solver()

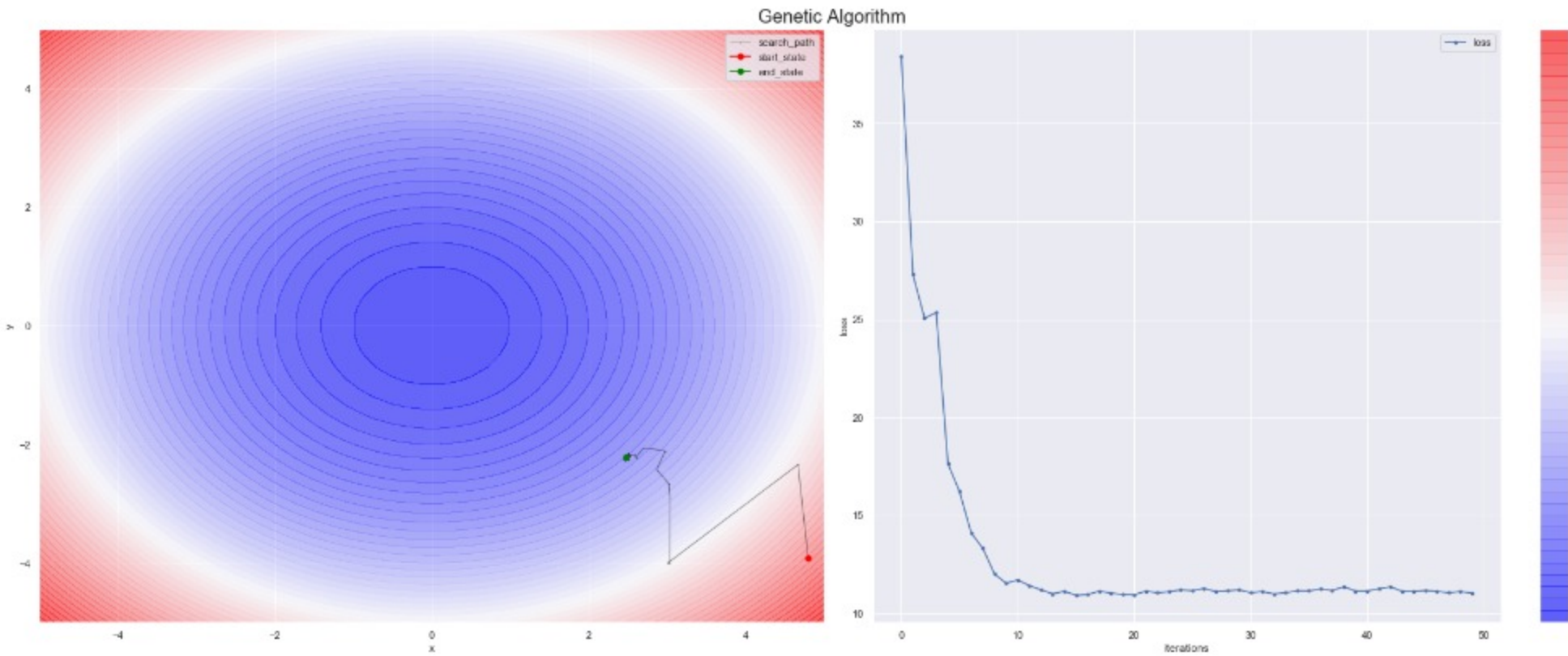
[ 2020-12-03 16:03:30,189 - francium.algorithms.genetic_algorithm.solver ] INFO: => Initialized Agent !
```

```
In [6]: for episode in range(50):
trainable = solver.train_step()
if not trainable:
    break
```

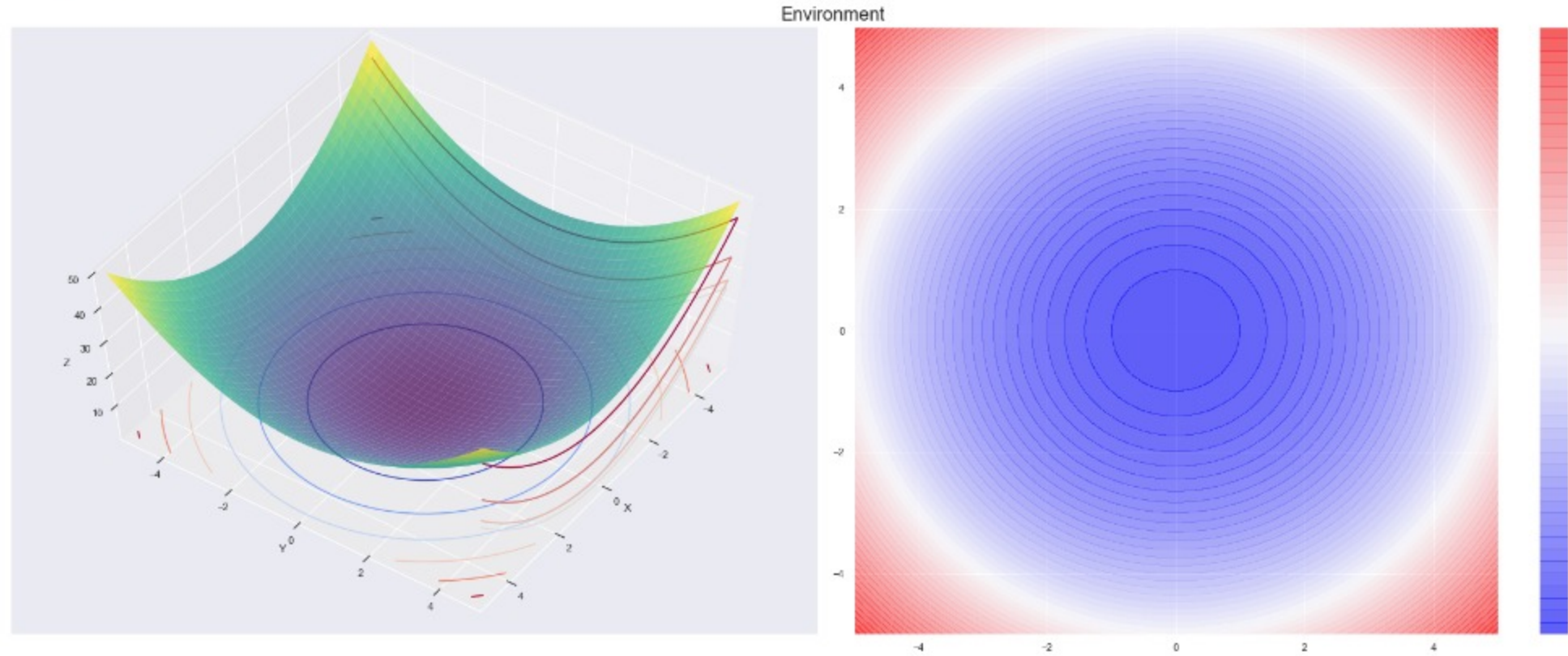
```
In [7]: solver.memory.best_episode
```

```
Out[7]: {'x': 2.5146588957311944, 'y': -2.1445624334917754, 'z': 10.922657393024195}
```

```
In [8]: solver.plot_history()
```



```
In [9]: env.plot_environment()
```



using an environment with $z = 5 * \sin(x^2 + y^2) + x^2 + y^2$

```
In [11]: agent = ga.Agent()
env = ga.Environment(x_bounds=(-5.0, 5.0), y_bounds=(-5.0, 5.0), eval_func=eval_functions.sinx_plus_x)
solver = ga.Solver(agent=agent, environment=env, pop_size=100)
```

```
In [12]: solver.init_solver()

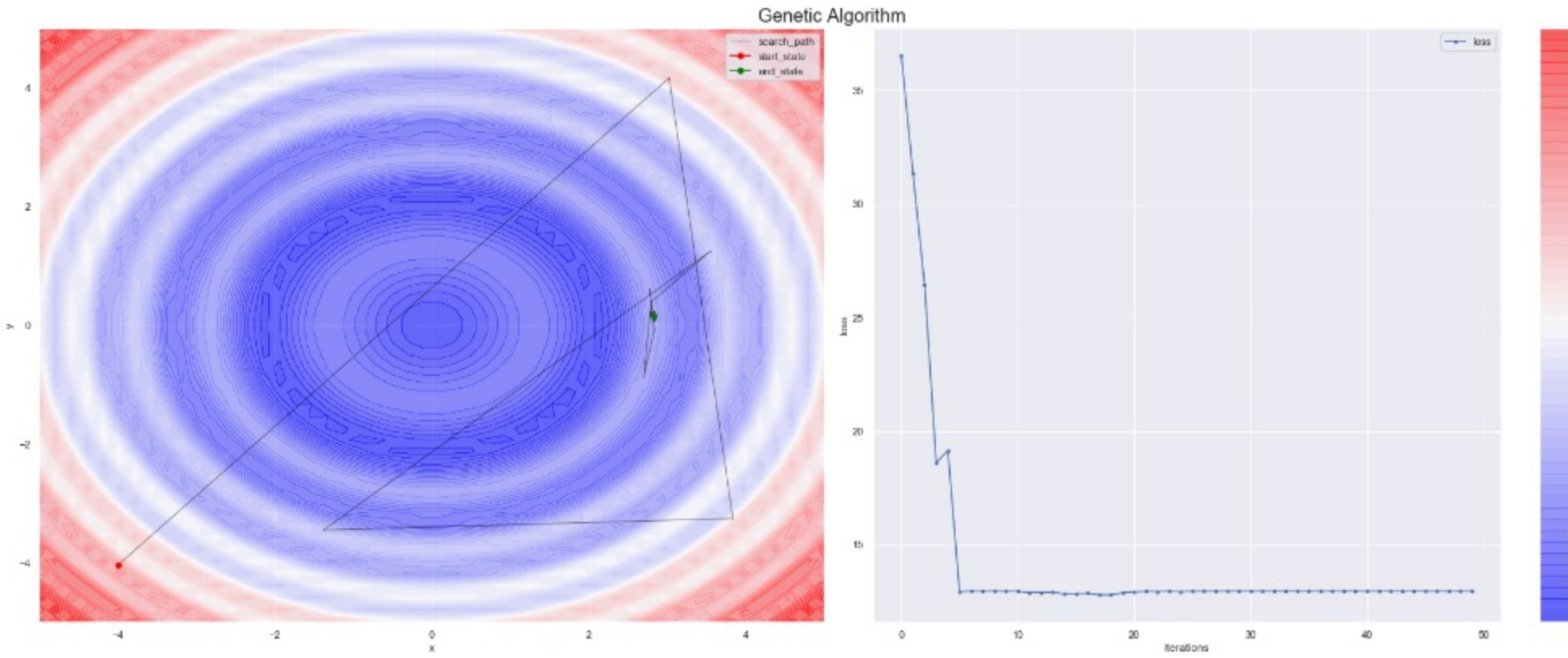
[ 2020-12-03 16:06:02,604 - francium.algorithms.genetic_algorithm.solver ] INFO: => Initialized Agent !
```

```
In [13]: for episode in range(50):
trainable = solver.train_step()
if not trainable:
    break
```

```
In [14]: solver.memory.best_episode
```

```
Out[14]: {'x': 2.7889714146335893, 'y': 0.15665519229271258, 'z': 12.796381098863423}
```

```
In [15]: solver.plot_history()
```



```
In [16]: env.plot_environment()
```

