2.3

March 24, 2024

[1]:
```
import matplotlib.pyplot as plt
import jax
from jax import numpy as np
from jax import scipy as sp
```

[2]:
```
A = np.array([[1., 0.],
              [-1., 1.]])
n = 2
y = np.array([3., 2.])
Sigma = np.array([[0.5, 0.],
                  [0., 1.]])
```

[3]:
```
def f(x):
    return np.linalg.norm(Sigma @ x, ord=np.inf) - 1 + np.linalg.norm(sp.linalg.
 ↪sqrtm(A) @ (x - y), ord=2) - 1
```

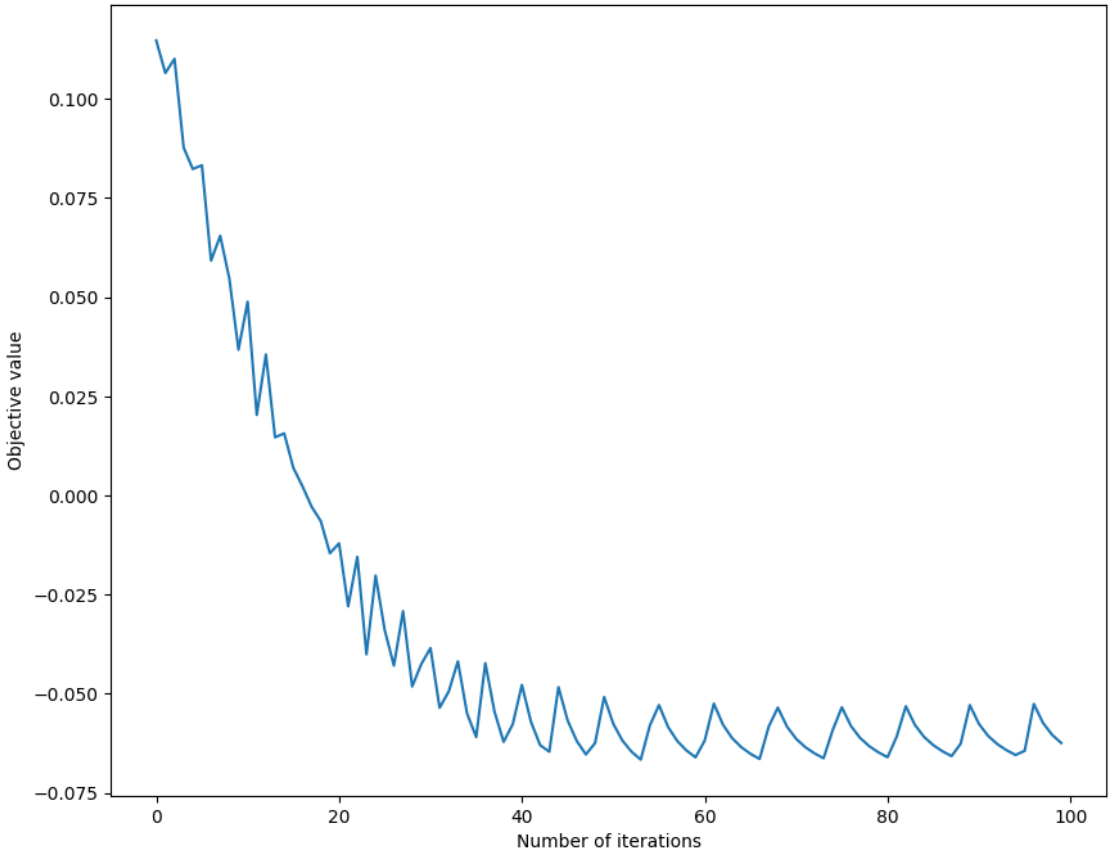
[4]:
```
x = np.array([2., 1.])
alpha = 0.08

datax = []
datay = []
for i in range(100):
    x = x - alpha * jax.grad(f)(x)
    datax += [i]
    datay += [f(x)]
```

```
/home/_wajs_err_/.local/lib/python3.11/site-packages/jax/_src/lax/lax.py:2660:
ComplexWarning: Casting complex values to real discards the imaginary part
  x_bar = _convert_element_type(x_bar, x.aval.dtype, x.aval.weak_type)
```

[5]:
```
plt.figure(figsize=(10, 8))
plt.plot(datax, datay)
plt.xlabel('Number of iterations')
plt.ylabel('Objective value')
```

[5]:
```
Text(0, 0.5, 'Objective value')
```


0.100
0.075
0.050
0.025
0.000
−0.025
−0.050
−0.075
Objective value
0
20
40
60
80
100
Number of iterations