

Part 0

Offline Model: SCPM

Algorithm 1 Offline SCPM

```
initialize k
initialize m
initialize n
initialize x
initialize s
initialize z
initialize a = random number between (1,2) of size k x m
initialize p = random number between (0,1) of size m x 1
initialize q = random number between (10,20) of size k x 1
initialize pi =  $a^T p$  + random number between (0, 0.2) of size k x 1
initialize w
objective1 = Maximize( $pi^T * x - z + w * \Sigma(\log s_i / m)$ )
objective2 = Maximize( $pi^T * x - z + w * \Sigma(1 - e^{-s_i} / m)$ )
constraints = [ $a^T x - z + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem1 = Problem(objective1, constraints)
problem1.solve(solver=CVXOPT)
```

Online Model 1: SCPM

Algorithm 2 Online SCPM

```
initialize k
initialize m
initialize n
initialize x
initialize s
initialize z
initialize a = random number between (1,2) of size k x m
initialize p = random number between (0,1) of size m x 1
initialize q = random number between (10,20) of size k x 1
initialize pi =  $a^T p$  + random number between (0, 0.2) of size k x 1
initialize w
objective1 = Maximize( $pi^T * x - z + w * \Sigma(\log s_i / m)$ )
objective2 = Maximize( $pi^T * x - z + w * \Sigma(1 - e^{-s_i} / m)$ )
part 1:
constraints = [ $x[n:] == 0.0, a^T x - z + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem1 = Problem(objective1, constraints)
problem1.solve(solver=CVXOPT)
part 2:
c = x[0:n]
constraints = [ $x[0:n] - c == 0, a^T x - z + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem2 = Problem(objective1, constraints)
problem2.solve(solver=CVXOPT)
```

Online Model 2: SCPM

Algorithm 3 Online SCPM

```
initialize k
initialize m
initialize n
initialize x
initialize s
initialize z
initialize a = random number between (1,2) of size k x m
initialize p = random number between (0,1) of size m x 1
initialize q = random number between (10,20) of size k x 1
initialize pi =  $a^T p$  + random number between (0, 0.2) of size k x 1
initialize w
objective1 = Maximize( $pi^T * x - z + w * \Sigma(\log s_i / m)$ )
objective2 = Maximize( $pi^T * x - z + w * \Sigma(1 - e^{-s_i} / m)$ )
part 1:
constraints = [ $x[n:] == 0.0, a^T x - z + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem1 = Problem(objective1, constraints)
problem1.solve(solver=CVXOPT)
part 2:
for l=n;l<k;l++ do
    c = x[0:l]
    constraints = [ $x[0:l] - c == 0, x[l+1:] == 0, a^T x - z + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
end for
c = x[0:n]
constraints = [ $x[0:n] - c == 0, a^T x - z + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem2 = Problem(objective1, constraints)
problem2.solve(solver=CVXOPT)
```

Part 3

Offline Model: SCPM

Algorithm 4 Offline SCPM

```
initialize k
initialize m
initialize n
initialize x
initialize s
initialize b = 1000 of size k x 1
initialize a = random number between (1,2) of size k x m
initialize p = random number between (0,1) of size m x 1
initialize q = random number between (10,20) of size k x 1
initialize pi =  $a^T p$  + random number between (0, 0.2) of size k x 1
initialize w
objective1 = Maximize( $pi^T * x + w * \Sigma(logs_i/m)$ )
objective2 = Maximize( $pi^T * x + w * \Sigma(1 - e^{-s_i}/m)$ )
constraints = [ $a^T x - b + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem1 = Problem(objective1, constraints)
problem1.solve(solver=CVXOPT)
```

Online Model 1: SCPM

Algorithm 5 Online SCPM

```
initialize k
initialize m
initialize n
initialize x
initialize s
initialize b = 1000 of size k x 1
initialize a = random number between (1,2) of size k x m
initialize p = random number between (0,1) of size m x 1
initialize q = random number between (10,20) of size k x 1
initialize pi =  $a^T p$  + random number between (0, 0.2) of size k x 1
initialize w
objective1 = Maximize( $pi^T * x + w * \Sigma(logs_i/m)$ )
objective2 = Maximize( $pi^T * x + w * \Sigma(1 - e^{-s_i}/m)$ )
part 1:
constraints = [ $x[n:] == 0.0, a^T x - b + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem1 = Problem(objective1, constraints)
problem1.solve(solver=CVXOPT)
part 2:
c = x[0:n]
constraints = [ $x[0:n] - c == 0, a^T x - b + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem2 = Problem(objective1, constraints)
problem2.solve(solver=CVXOPT)
```

Online Model 2: SCPM

Algorithm 6 Online SCPM

```
initialize k
initialize m
initialize n
initialize x
initialize s
initialize z
initialize a = random number between (1,2) of size k x m
initialize p = random number between (0,1) of size m x 1
initialize q = random number between (10,20) of size k x 1
initialize pi =  $a^T p$  + random number between (0, 0.2) of size k x 1
initialize w
objective1 = Maximize( $pi^T * x + w * \Sigma(\log s_i / m)$ )
objective2 = Maximize( $pi^T * x + w * \Sigma(1 - e^{-s_i} / m)$ )
part 1:
constraints = [ $x[n:] == 0.0, a^T x - b + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem1 = Problem(objective1, constraints)
problem1.solve(solver=CVXOPT)
part 2:
for l=n;l<k;l++ do
    c = x[0:l]
    constraints = [ $x[0:l] - c == 0, x[l+1:] == 0, a^T x - b + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
end for
c = x[0:n]
constraints = [ $x[0:n] - c == 0, a^T x - b + s == 0, x \leq q, x \geq 0, s \geq 0$ ]
problem2 = Problem(objective1, constraints)
problem2.solve(solver=CVXOPT)
```
