Homework

November 11, 2019

1 Lecture 4

1. Consider a function $v(x)$ which is strongly convex with constant 1 on a convex set X w.r.t. *general* norm $\|\cdot\|$. Define a function $V(x,z) = v(z) - (v(x) - \langle \nabla v(x), z - x\rangle)$. Consider iterates

$$x_{t+1} = \arg\min_{x \in X} \gamma_t \langle \nabla f(x_t), x\rangle + V(x_t, x)$$

for minimization of a function f on the set X, such that $\|\nabla f(x_t)\|_* \leq M$ ($\|\cdot\|_*$ – is the norm conjugate to $\|\cdot\|$) and $\max_{x,y\in X} V(x,y) \leq D^2$. Estimate the convergence rate of this algorithm, called Mirror Descent, repeating similar steps as in the proof of the convergence rate of subgradient descent.