Thomas Kesselheim
Anna Heuser

December 20, 2023

Algorithms and Uncertainty

Winter Term 2023/24

Tutorial Session - Week 11

Exercise 1:
Show that the EXP3 algorithm can also be applied to an instance of Stochastic Multi-Armed Bandits from lecture 17.
Additionally, show that, when setting $\eta = \sqrt{\frac{\ln n}{nT}}$ and $\gamma = n\eta$, this leads to an expected regret of at most $3\sqrt{nT \ln n}$.
Hint: You can use the bound on the external regret of EXP3 from lecture 20.

Exercise 2:
Let each $l_i^{(t)} \in \{0, 1\}$. We consider the following Greedy algorithm. In each step t, the algorithm selects I_t which satisfies $I_t = \arg\min_{i \in [n]} L_i^{(t-1)}$, i.e. the expert with the best cumulative cost so far (ties are broken adversarially).
Show that $L_{\text{Alg}}^{(T)} \leq n \cdot \min_i L_i^{(T)} + (n-1)$