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December 15, 2025
Due: January 05, 2026 at 10:00 p.m.

Algorithms and Uncertainty

Winter Term 2025/26

Exercise Set 10

If you would like to present one of your solutions in class, please use the following link to book a presentation slot by Monday evening:
https://terminplaner6.dfn.de/b/172f7e2d160102d643b7b799ce1e0780-1528361
A short meeting to discuss your solution is mandatory before presenting it in class. To book a time slot for this meeting, please use the following link by Monday evening as well:
https://terminplaner6.dfn.de/b/23c81d6aec026b545872d6534bc70d26-1528356

Exercise 1: (4 Points)
Consider the following explore-exploit algorithm. In the first $\frac{T}{2}$ steps (so $k = \frac{T}{2n}$), we explore. Afterwards, we exploit the most promising arm. Use the approach from Lecture 17 to derive an upper-bound for the expected regret of this algorithm.

Exercise 2: (4 Points)
We consider a generalization of the algorithm *Weighted Majority* for classifiers with k different classes. (The case covered in the lecture, binary classification, is $k = 2$.) In each step, the algorithm chooses a class, which is recommended by the largest number of classifiers (so the class has a plurality).
Show that this algorithm makes at most $(k + k\eta) \min m_i + k \ln n/\eta$ errors, where m_i is the number of errors of classifier i.
Bonus: Tighten this bound to $(2 + 2\eta) \min m_i + 2 \ln n/\eta$.