Online Motion Planning, SS 16
Exercise sheet 10
University of Bonn, Inst. for Computer Science, Dpt. I

- *You can hand in your written solutions until Wednesday,* 29.06., 14:15, *postbox in front of room E.01 LBH.*

Exercise 28: Multi-list traversal strategies (4 points)

Let $\Lambda = \{l_9, l_3, l_4, l_2, l_6\}$ be a set of $m = 5$ lists, where l_i denotes the length of list i. Consider the multi-list traversal problem (MLTP) and its partially and uninformed variant.

1. Compute $\xi(\Lambda)$. For the partially informed variant of MLTP, which FDT-strategy is optimal w.r.t. the worst case?
2. Compute the upper bound for $\overline{\xi}(\Lambda)$ using the formula. Which FDT-strategy holds this bound in the average case? Is this strategy the best possible for the average case?
3. Apply breadth-first (= FDT(λ_m)), depth-first (= FDT(λ_1)) and hyperbolic traversal (HT) using the ordering of the lists given above. Record the traversal costs for each strategy on the given ordering, as well.

Exercise 29: Fixed-depth traversal (4 points)

Let Λ be a set of m lists. In the following, consider the competitive ratio of traversal costs of the partially informed strategy FDT and a reasonable fully informed strategy. Show that the competitive ratio of breadth-first traversal (= FDT(λ_m)) is $\Omega(m)$ and the competitive ratio of depth-fist traversal (= FDT(λ_1)) is unbounded.

Exercise 30: Average traversal costs (4 points)

Complete the proof of the upper bound of $\overline{\xi}(\Lambda)$. It remains to show that the expected number of lists of length greater than λ_k that are traversed before $\textsc{fdt}(\lambda_k)$ terminates, is $\frac{(k-1)}{(m-k+2)}$.

Hint: Model the situation as a bit-string and analyse the expected number of leading zeros.