

Improving Algorithm Selection Systems

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What are Algorithm Selection Systems?

- ▶ In practice, there are multiple ways to solve a given problem.
- ▶ Algorithm selection systems are machine learning models which help find the best algorithm to solve a given problem with the goal of reducing the time to solve the problem (runtime) and increasing the solution quality.
- ▶ For example, if we want to sort an array of integers, if the array is already sorted, Insertion sort is faster than Quick sort which is faster than Insertion sort on average.

What is the problem?

- ▶ In practice, we observe that in some cases, Algorithm selection systems select algorithms, which perform worse than Single-best solvers which are algorithms which perform the best on average on all problem instances.
- ▶ This is a problem because we are spending extra computing resources only to select an algorithm which performs worse than the algorithm we already know works well on most cases. So, we might as well just use the single best solver and perform better and also not waste the extra computing resources we spent on trying to select one.

What are we doing?

- ▶ We are currently looking into scenarios where Algorithm selection systems perform worse than the SBS (Single Best Solver)
- ▶ The idea is to improve the Algorithm Selection systems in practice by leveraging the information we find from this research.