The Lifelong planning A\* algorithm is an approach to combine the popular A\* pathfinding algorithm with artificial intelligence. Heuristic search methods such as A\* approximate the distance from the final point to focus on the search and work better than un-informed search methods. On the other hand, incremental search methods such as DynamicSWSF-FP reuse information from previous searches to find the shortest path faster than solving the shortest path from scratch at each new point. The research paper proposes a method that combines both the A\* algorithm and incremental search, and is faster at finding the shortest path as compared to the above methods individually.

There have been attempts to build an AI system that can find the shortest path however these systems replan from scratch and solve the path planning problems independently. This is a very impractical method in environments with frequent changes. These changes are usually very small, and therefore solving these path planning problems from scratch can be wasteful. This led to the idea of making use of incremental search in combination with an informed, heuristic-based method.

The first example of LPA\* in action makes use of a 15x20 grid where some of the cells are blocked off. Some of the cells are changed from blocked cells to open cells, but the number of blocked cells remains constant. A modified version of DynamicSWSF-FP, which terminates after its sure that it has found the shortest path, has been used to compare against the performance of LPA\*. The modification has been made to increase its efficiency and so that the test isn’t skewed in favor of LPA\*. The authors have graphed each outcome, and the cells whose start distances have changed after the change in the grid have been shaded in grey. As we can see LPA\* has the least grey shaded squares suggesting that it is able to replan faster and more efficiently than DynamicSWSF-FP and A\*.