Analysis of Search Algorithms for E-commerce Platform

# 1. Introduction

In an e-commerce platform, efficient search is critical for user experience. We evaluate two search algorithms—Linear Search and Binary Search—in terms of their time complexity and applicability.

# 2. Algorithm Overview

## 2.1 Linear Search

Linear Search sequentially checks each element in the list until the target is found or the end is reached. It works on both sorted and unsorted lists.

## 2.2 Binary Search

Binary Search repeatedly divides a sorted list in half, eliminating the half that does not contain the target. It only works on sorted arrays and offers better performance on large datasets.

# 3. Time Complexity Comparison

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| --- | --- | --- | --- |
| Algorithm | Best Case | Average Case | Worst Case |
| Linear Search | O(1) | O(n) | O(n) |
| Binary Search | O(1) | O(log n) | O(log n) |

# 4. Recommendation

For small or unsorted datasets, Linear Search is simple and sufficient. However, for larger datasets, Binary Search is significantly faster, assuming the data is sorted beforehand. Therefore, we recommend Binary Search for better scalability and performance in production-grade e-commerce systems.