

Algorithmic Thinking Exploration Report

Participants

1. Titan – A good friend who's pretty structured with his routines.
2. Josh – Another friend, passionate about fitness and staying consistent with his workouts.

Algorithm 1: Titan's Laundry Routine

Inputs: Dirty clothes, detergent, washing machine, dryer

Outputs: Clean, folded clothes

Steps:

1. Collect all the dirty clothes.
2. Sort them into three piles: lights, darks, and whites.
3. Load one pile into the washing machine, add detergent, and start it.
4. When the washer is done, move the clothes to the dryer.
5. Take out the dried clothes and fold them.
6. Repeat for the remaining piles.
7. Put the folded clothes away.

Big O Notation:

- n represents the number of laundry loads.
- The efficiency is $O(n)O(n)$ since the time grows linearly with the number of loads.

Insights:

Titan's system is simple and effective, but he could make it faster by folding clothes while the next load is washing or drying.

Algorithm 2: Josh's Gym Routine

Inputs: Gym equipment, workout plan, time

Outputs: Completed workout session

Steps:

1. Check the day's workout plan to see what muscle groups to focus on (e.g., arms, legs).
2. Warm up for 5–10 minutes with stretches or light cardio.
3. Perform each exercise on the plan:
 - Do 3 sets of 10 reps for strength exercises.
 - For cardio, complete 20–30 minutes.
4. Rest for 1–2 minutes between exercises or sets.
5. Cool down with stretches to finish.

Big O Notation:

- n refers to the number of exercises in the workout plan.
- The efficiency is $O(n)O(n)$, as each exercise is done sequentially.

Insights:

Josh's routine is highly disciplined, but he could save time by using supersets—doing two exercises back-to-back with little rest.

Card Sorting Experiment

Participant: Titan

Observed Algorithm:

1. Start with the first card and create a new pile.
2. Take the next card and compare it to the cards in the pile.
3. Insert it in the correct position.
4. Repeat until all cards are sorted.

Number of Comparisons Made: 140

Big O Notation:

- n is the total number of cards in the deck.
- The efficiency is $O(n^2)O(n^2)$ because it's like an insertion sort where each new card is compared to multiple cards in the sorted pile.

Insights:

Titan's method was accurate but slow. If he used a more efficient approach like merge sort ($O(n \log^2 n)$), he'd save a lot of time, especially with larger decks.

Reflections

Talking to Titan and Josh made me realize how we all use algorithms without even thinking about it. Titan's laundry routine and Josh's gym plan are great examples of creating order. They work, but small tweaks—like folding during the wash or trying supersets—could save time.

The card sorting experiment was also a cool way to see how important efficiency is. Watching Titan work through 140 comparisons reminded me that knowing the right algorithm can make a big difference. Overall, this project made me more aware of the routines I use and how I can improve them.