

# CS3500 LAB 7 - Disk Scheduling - Report

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## Assumptions made

The following assumptions were made for the scheduling algorithms SCAN, C-SCAN, LOOK and C-LOOK - that the jump across the two ends for C-SCAN and C-LOOK counts towards head movement, and that the initial direction of head movement is towards the closest end, i.e., for the disk size of 5000, initial head positions of <2500 move left, and other positions move right.

## Observations

Values of average head movement for initial head position of 2000 (as present in screenshots):

Scheduling Algorithm	Average head movement
FCFS	1629.937
SSTF	6.999
SCAN	6.997
C-SCAN	9.991
LOOK	6.994

C-LOOK	9.989
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**FCFS** requires the **most head movement**, with a lead over other algorithms by an order of 100, due to its completely disordered head movement, jumping between the random values generated, while the other scheduling algorithms create some order from the randomness.

**SSTF**, **LOOK** and **SCAN** have the **lowest average head movement**, with values very close to each other. LOOK has a small advantage over SCAN as it doesn't go all the way until the end of the disk the way SCAN does. SSTF has a disadvantage as compared to the other two as it may move toward the farther end first, seeing a closer target, and have to make a large return in the end (another average value seen for head = 2000 was 7.9xx, an extra ~1 due to moving toward the upper end of the disk).

After these come **C-SCAN** and **C-LOOK**, which are still far far better than FCFS. These face a disadvantage in having to jump from one end of the disk to the other, which impacts their total head movement.

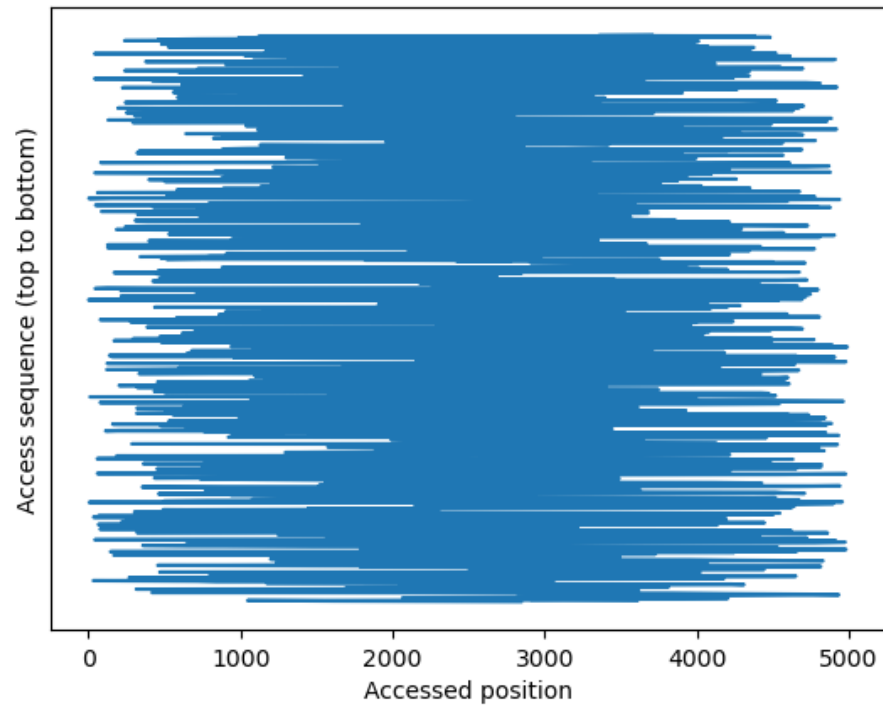
FCFS, C-SCAN and C-LOOK have consistent total head movement, i.e., they do not vary much with the initial head position. FCFS has no choice and can only rely on the randomness of the access sequence. C-SCAN and C-LOOK almost assuredly have to perform a jump from one end to the other, and the other movements remain nearly the same.

SSTF, SCAN and LOOK vary more. SSTF varies a lot when head is initialized near the ends, due to randomness, since if the closest target at the beginning is away from the nearer end, it might lead to movement towards the farther end, and return all the way to the other end, leading to a larger average. If the closest target were towards the closer end, this large jump would not be required. This is the reason for so many variations as seen in the average head movement variance plot for SSTF. SCAN and LOOK vary essentially linearly, with the increase in head movement being due to the increased "bounce" movement, as the increase in head movement to reach the nearest end increases, causing an increase in the return movement to the other half to be scanned.

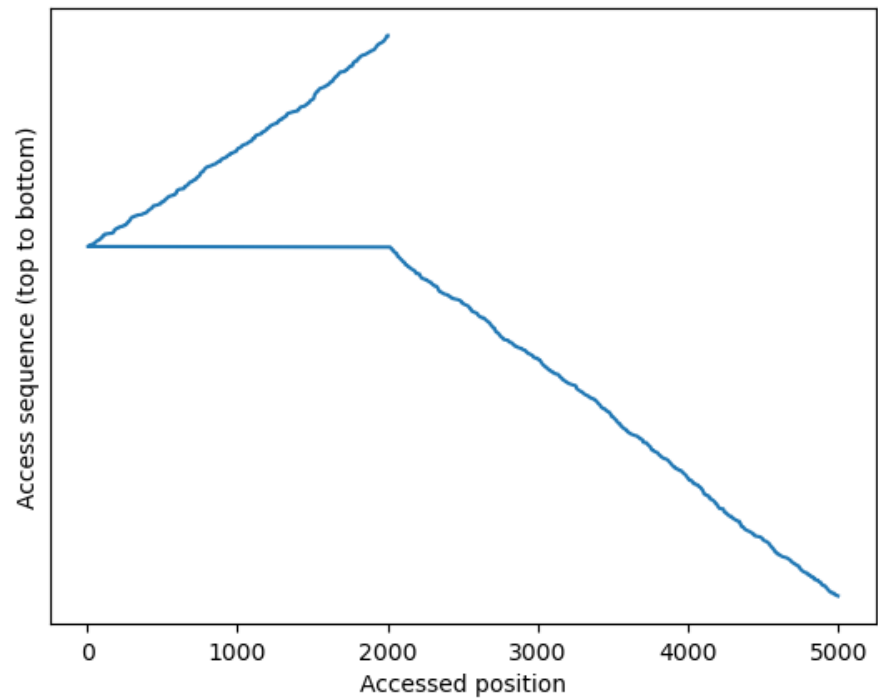
## Illustrations

### Head movement plots

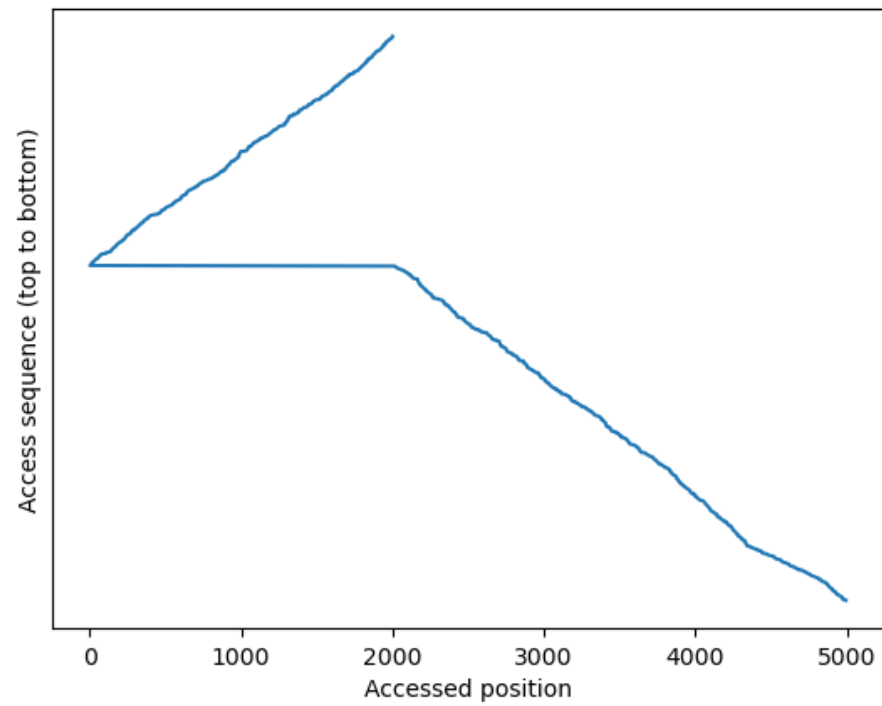
FCFS



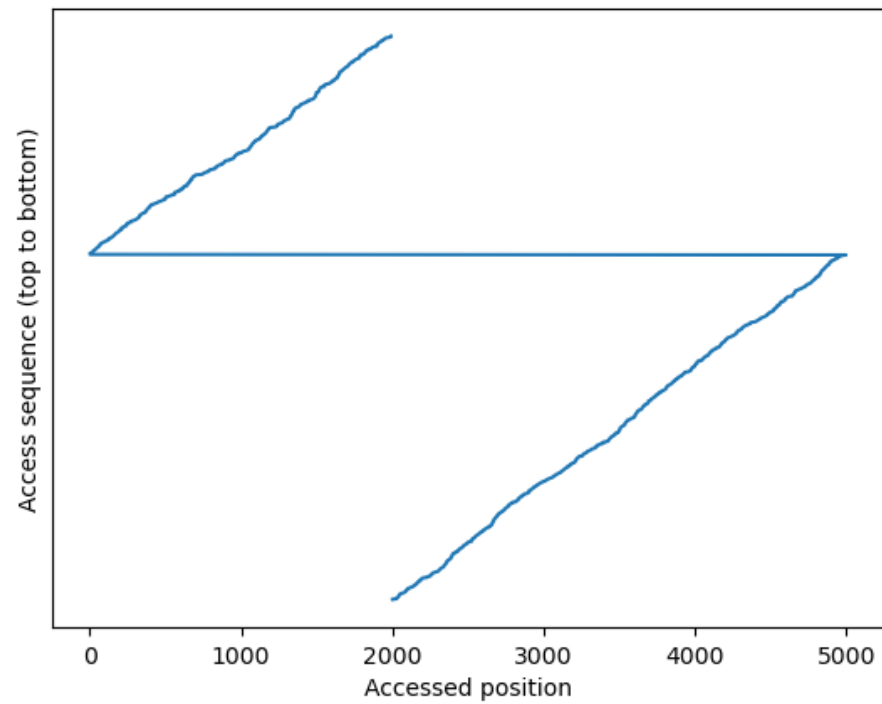
SSTF



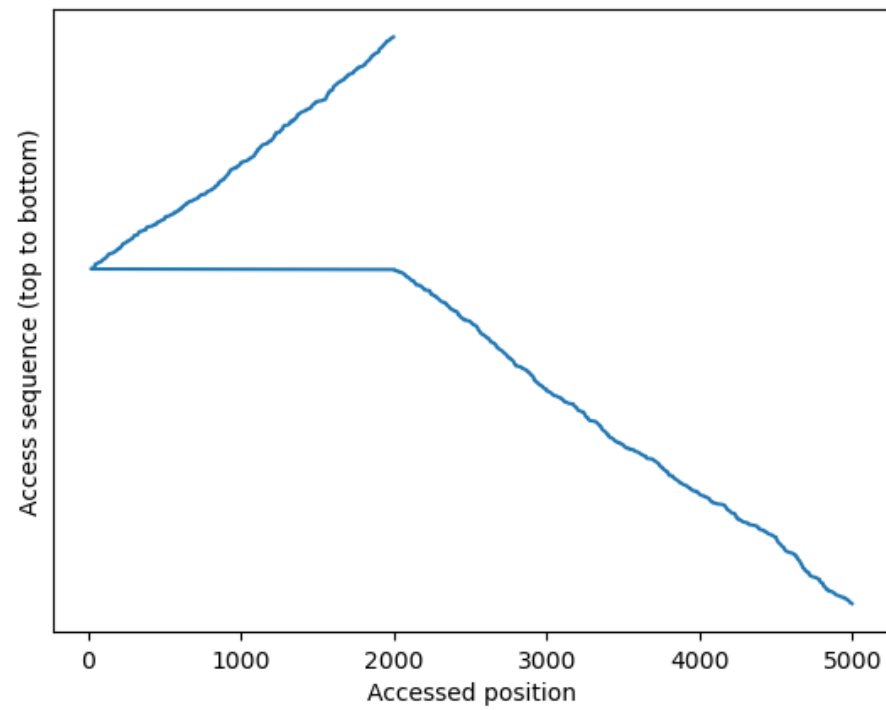
## SCAN



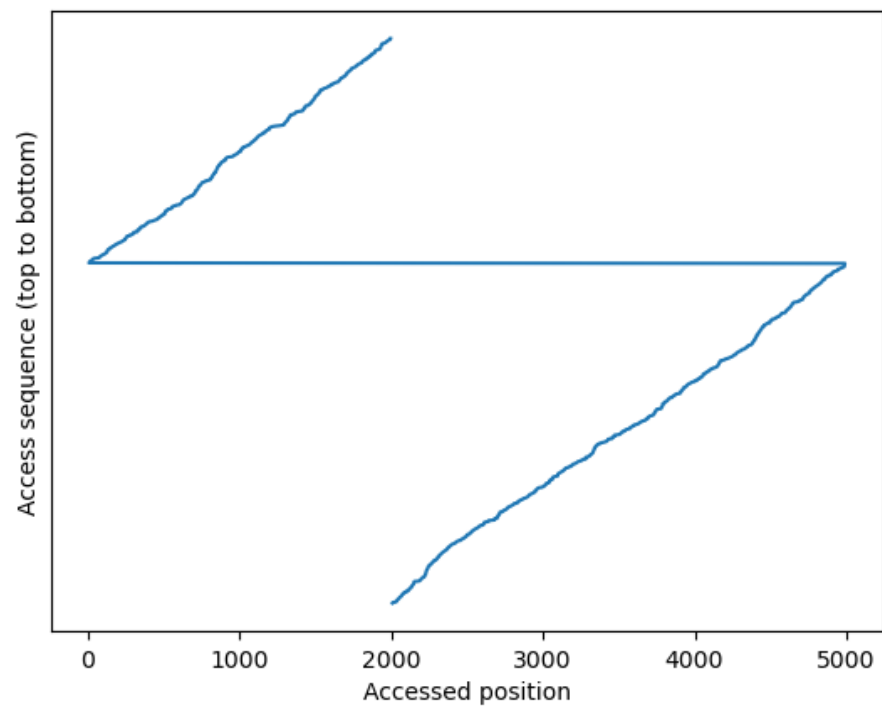
## C-SCAN



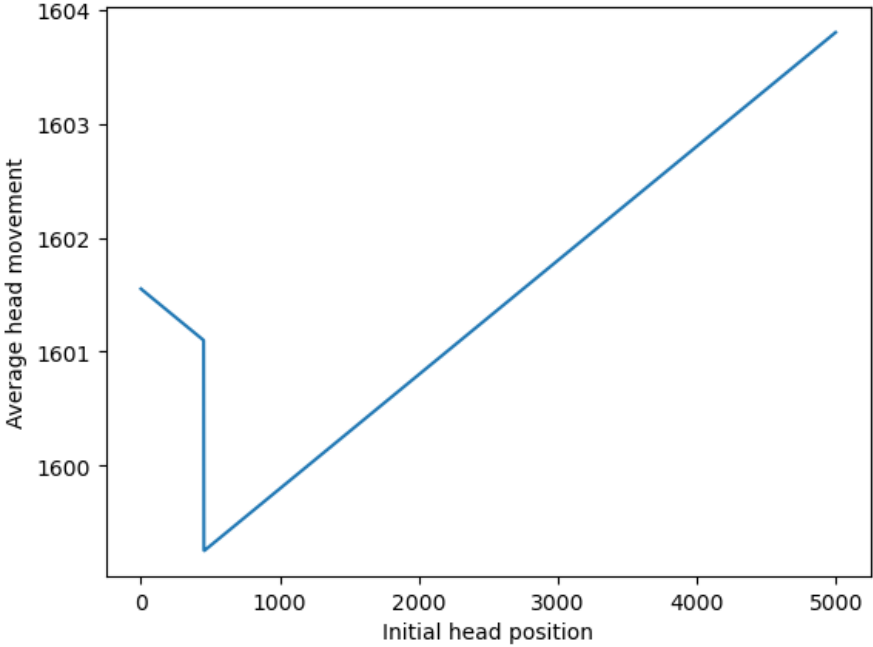
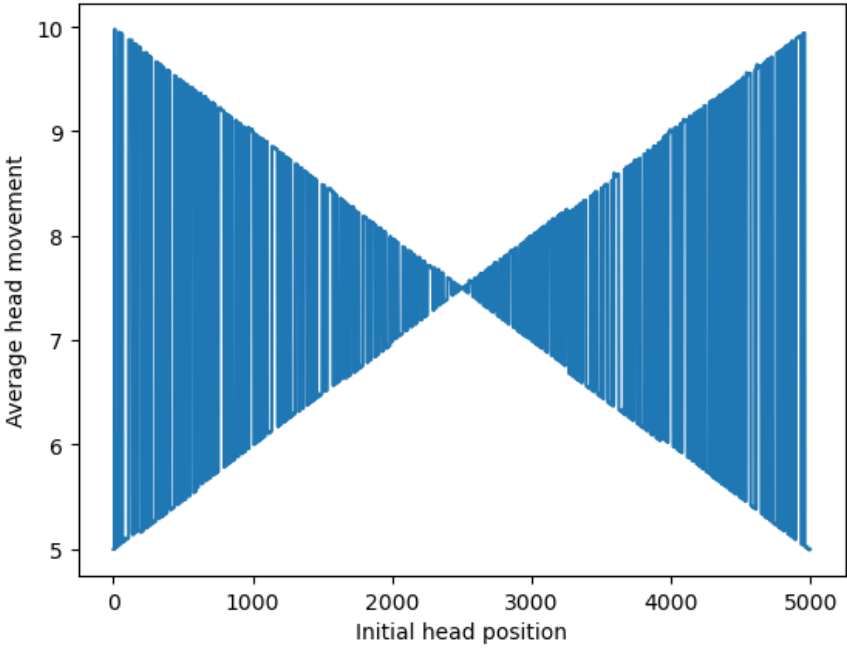
## LOOK



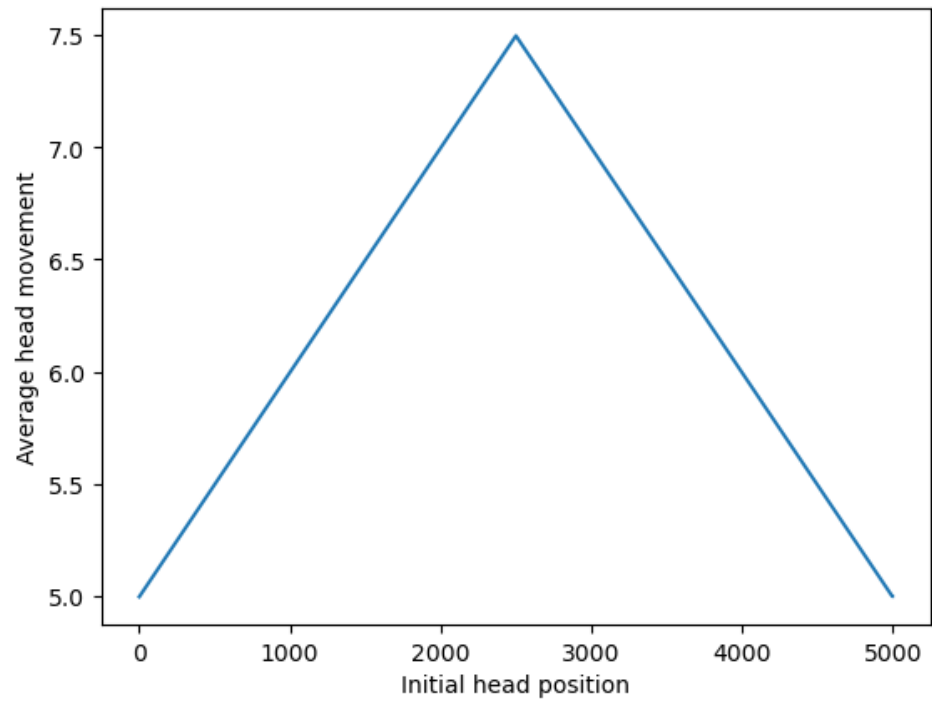
## C-LOOK



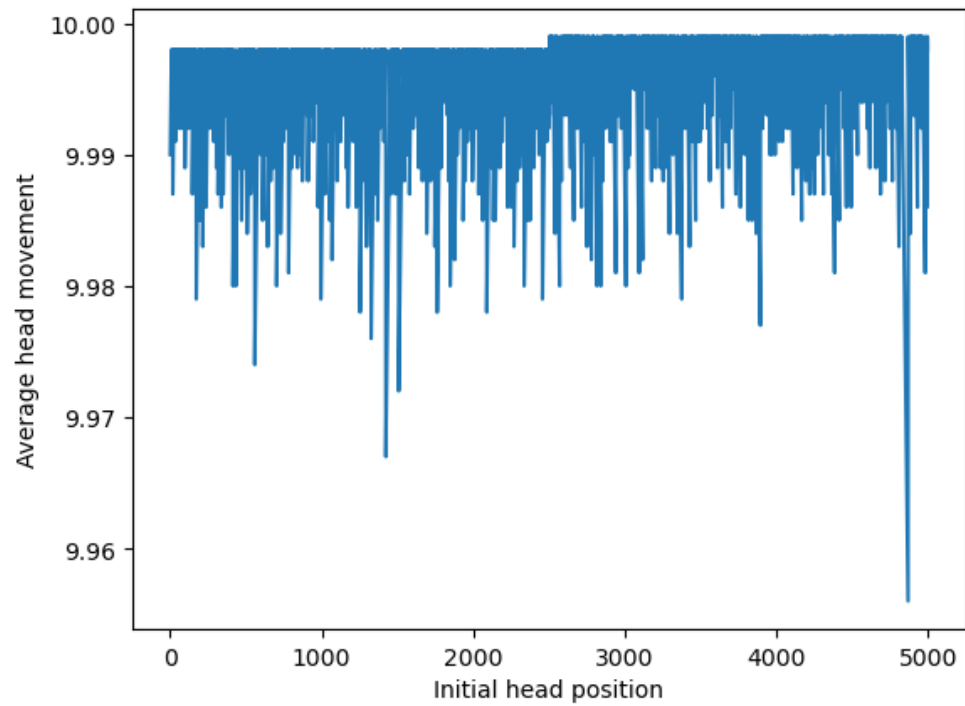
Average head movement variance plots

<p>FCFS</p>	 <p>The graph for FCFS scheduling shows the average head movement on the y-axis (ranging from 1600 to 1604) against the initial head position on the x-axis (ranging from 0 to 5000). The line starts at approximately (0, 1615.5), decreases to (500, 1601.1), drops vertically to (500, 1599.5), and then increases linearly to (5000, 1603.8).</p> <table border="1"><thead><tr><th>Initial head position</th><th>Average head movement</th></tr></thead><tbody><tr><td>0</td><td>1615.5</td></tr><tr><td>500</td><td>1601.1</td></tr><tr><td>500</td><td>1599.5</td></tr><tr><td>5000</td><td>1603.8</td></tr></tbody></table>	Initial head position	Average head movement	0	1615.5	500	1601.1	500	1599.5	5000	1603.8
Initial head position	Average head movement										
0	1615.5										
500	1601.1										
500	1599.5										
5000	1603.8										
<p>SSTF</p>	 <p>The graph for SSTF scheduling shows the average head movement on the y-axis (ranging from 5 to 10) against the initial head position on the x-axis (ranging from 0 to 5000). The area is filled with blue vertical lines, forming a triangular shape that narrows to a point at x=2500 and widens again towards x=5000.</p> <table border="1"><thead><tr><th>Initial head position</th><th>Average head movement</th></tr></thead><tbody><tr><td>0</td><td>10.0</td></tr><tr><td>2500</td><td>7.5</td></tr><tr><td>5000</td><td>5.0</td></tr></tbody></table>	Initial head position	Average head movement	0	10.0	2500	7.5	5000	5.0		
Initial head position	Average head movement										
0	10.0										
2500	7.5										
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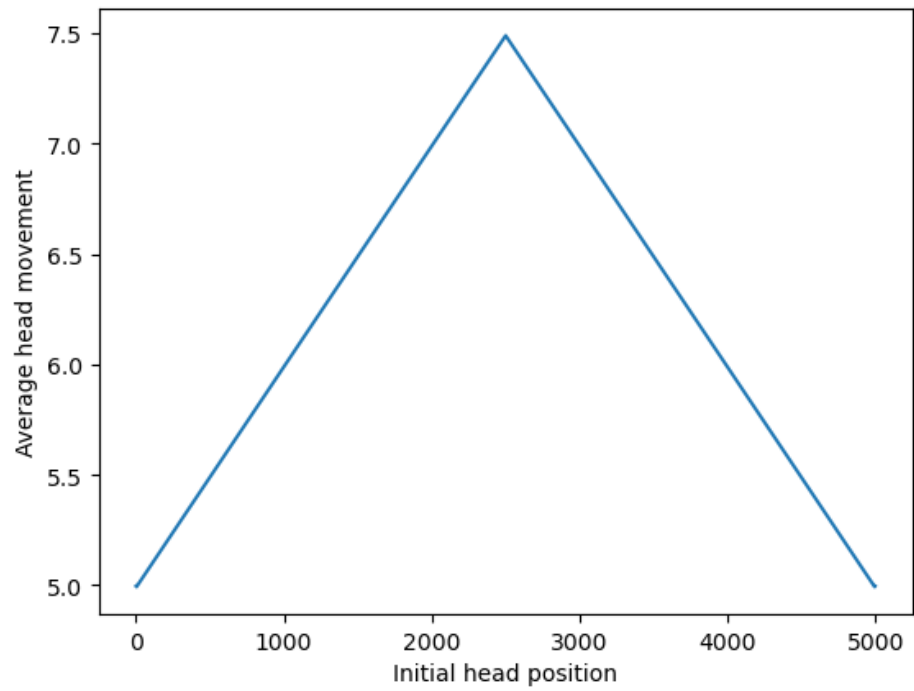
## SCAN



## C-SCAN



## LOOK



## C-LOOK

