IT351 Assignment 1

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TOPIC: FITT’S LAW

Fitt's Law:
Fitts' law states that the amount of time required for a person to move a pointer (e.g., mouse cursor) to a target area is a function of the distance to the target divided by the size of the target. Thus, the longer the distance and the smaller the target's size, the longer it takes.
The formula for calculating movement time using fitt's law is given as,
MT = a + b * log2(2A / W)
where,
MT : movement time
a,b : constants
A : distance from the starting point to the center of the target
W : width of the target measured along the axis of motion, which corresponds to accuracy

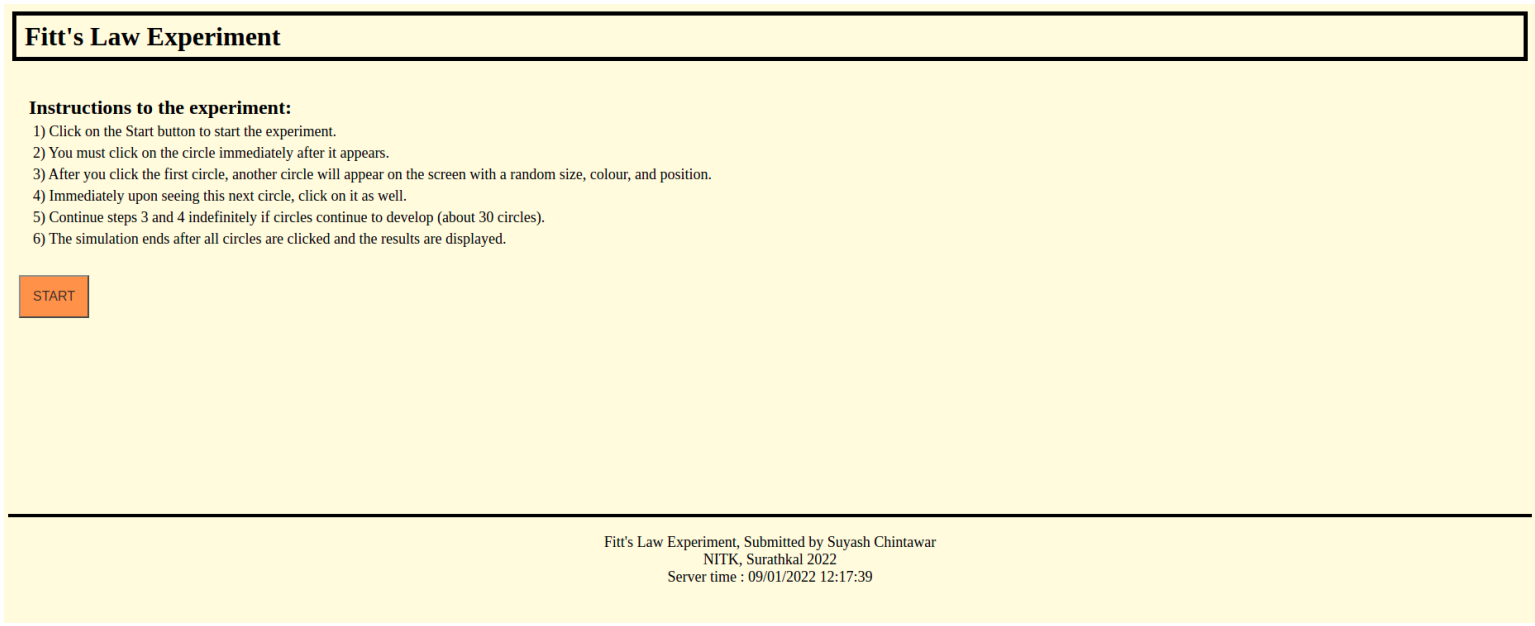
In the experiment performed in this assignment, circles are used as targets so the widths here are the diameters of the circles.

The term "log2(2A / W)" is called the index of difficulty(ID) whereas the term "1/b" is called the index of performance(IP).

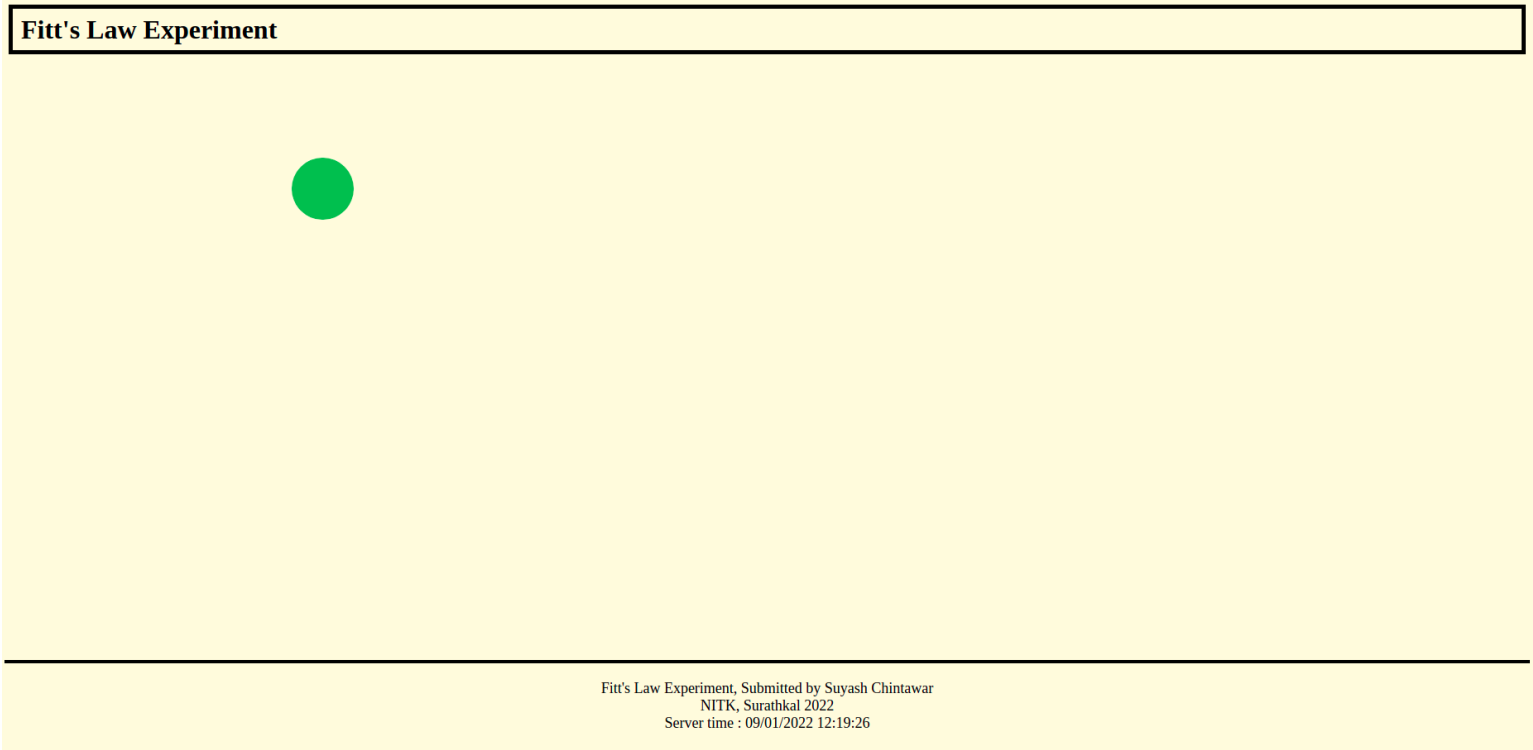
Rendering the web application:
1) Download and unzip the code folder(submitted in moodle).
2) Open the 'home.html' file.

Details of the Experiment:
1) Click on the Start button to start the experiment.
2) You must click on the circle immediately after it appears.
3) After you click the first circle, another circle will appear on the screen with a random size, color, and position.
4) Immediately upon seeing this next circle, click on it as well.
5) Continue steps 3 and 4 indefinitely if circles continue to develop (about 30 circles).
6) The simulation ends after all circles are clicked and the results are displayed.

Screenshots of the web application:



This is the first page that will be displayed. It contains the instructions regarding the experiment. Click on the ‘Start’ button to proceed to the simulation.



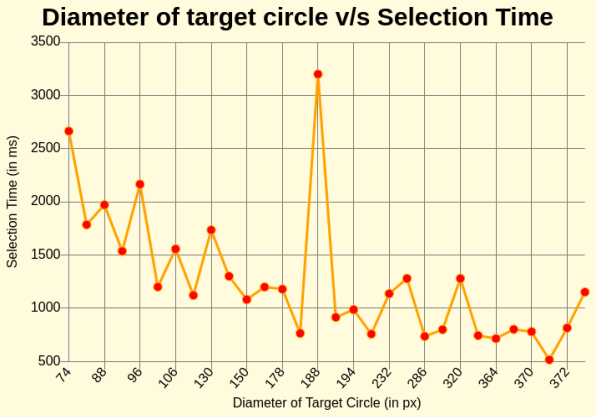
After clicking on the “Start” button, the simulation starts. A circle will appear on the screen and the user is supposed to click on the circle as fast as possible.

Circles with random sizes and color keep on appearing one after another anywhere on the screen. The user is supposed to click on all of them (30 circles). After all the circles are clicked on, the simulation automatically ends.

Fitt's Law Experiment

Table showing the selection time for a circle with a certain width and at a certain distance

Circle No.	Distance (in px)	Width (diameter in px)	Selection Time (in ms)
1	250	150	1081
2	1063	244	1279
3	384	342	743
4	122	188	764
5	327	364	714
6	417	194	914
7	86	372	515
8	140	286	735
9	711	194	986
10	332	300	799
11	238	368	801
12	720	130	1735
13	332	194	757
14	485	92	1536
15	128	86	1785
16	482	106	1557
17	23	232	1136
18	794	74	2664
19	325	98	1200
20	471	188	3200
21	258	396	1151
22	850	150	1199
23	1041	96	2165
24	235	372	814
25	446	88	1971
26	757	320	1279
27	600	110	1121
28	255	370	779
29	324	148	1300
29	324	148	1300
30	521	178	1179



Fitt's Law Experiment, Submitted by Suyash Chintawar
NITK, Surathkal 2022
Server time : 09/01/2022 12:20:23

The next and last page shows the results obtained from the simulation. The table on the left shows the selection time that the user took to click on the circle of the corresponding diameter(width) and the distance that the cursor had to cover from the previous circle to the target circle. The plot on the right shows the selection time (in milliseconds) against the diameter (in pixels) of the circles.

Results obtained by using Touchpad:

Table showing the selection time for a circle with a certain width and at a certain distance

Circle No.	Distance (in px)	Width (diameter in px)	Selection Time (in ms)
1	250	150	1081
2	1063	244	1279
3	384	342	743
4	122	188	764
5	327	364	714
6	417	194	914
7	86	372	515
8	140	286	735
9	711	194	986
10	332	300	799
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15	128	86	1785
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20	471	188	3200
21	258	396	1151
22	850	150	1199
23	1041	96	2165
24	235	372	814
25	446	88	1971
26	757	320	1279
27	600	110	1121
28	255	370	779
29	324	148	1300
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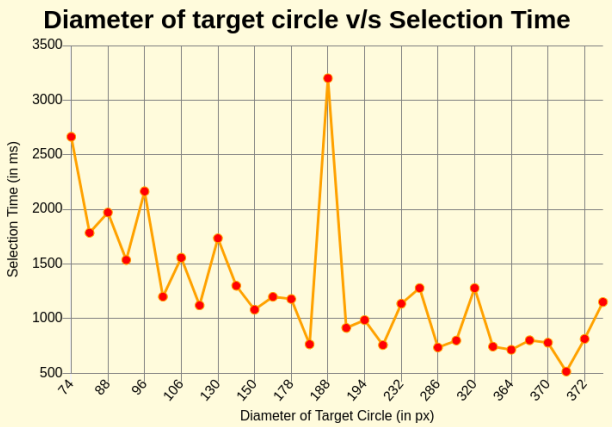
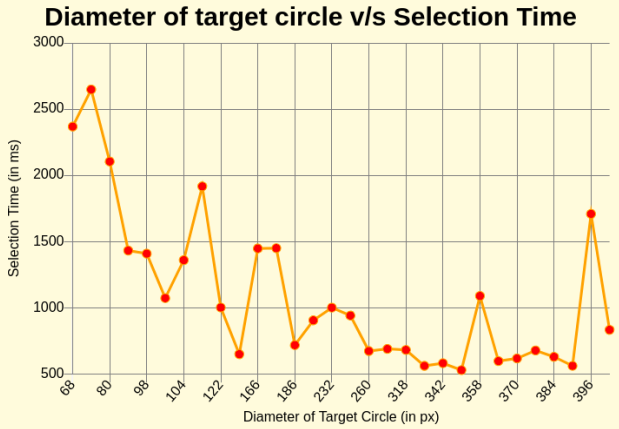


Results obtained by using Mouse:

Table showing the selection time for a circle with a certain width and at a certain distance

Circle No.	Distance (in px)	Width (diameter in px)	Selection Time (in ms)
1	250	150	648
2	257	272	688
3	114	340	560
4	278	390	560
5	581	232	1000
6	379	398	832
7	795	98	1408
8	373	92	1431
9	217	172	1449
10	895	384	676
11	152	342	580
12	971	396	1708
13	541	384	628
14	603	260	672
15	527	318	680
16	209	370	616
17	93	248	940
18	385	368	596
19	878	358	1088
20	131	348	528
21	551	120	1916
22	213	104	1072
23	921	80	2648
24	128	186	717
25	1378	104	1359
26	825	68	2368
27	278	80	2104
28	631	166	1447
29	219	122	1001
30	510	188	904



Observations and conclusions:

We observe that the slope of the graph is negative. This means that larger circles are easy to click on than the smaller ones. This proves fitt's law that if the width of the target is more, the accuracy of hitting the target is more. We also see that when a mouse is used to perform the experiment, the ease of movement increases. Hence, the average movement time in the case of mouse decreases. Thus, using a mouse gives better performance. The spikes that are obtained in the graph are due to the higher target distances. In such cases, even though the size of the target is big, selection time accounts more forthe cursor movement.

THANK YOU