

## CMPT481

### Assignment 1 Report

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#### 1. Goals of the experiment

The goal of this experiment was to determine what factors might affect visual searching through a series of icons. Throughout the experiment, different layouts of icons were tested, with layouts being defined by the total set size of icons to search through, and the pages that icons were split into, with one page representing a certain number of icons. With this experiment setup, the aim was to see how the different layouts affected the speed at which a target icon could be found, contrasting scrolling through small pages and visually scanning through large pages.

#### 2. Procedure

Below is a table which describes all the variables and conditions involved in the experiment which were tested.

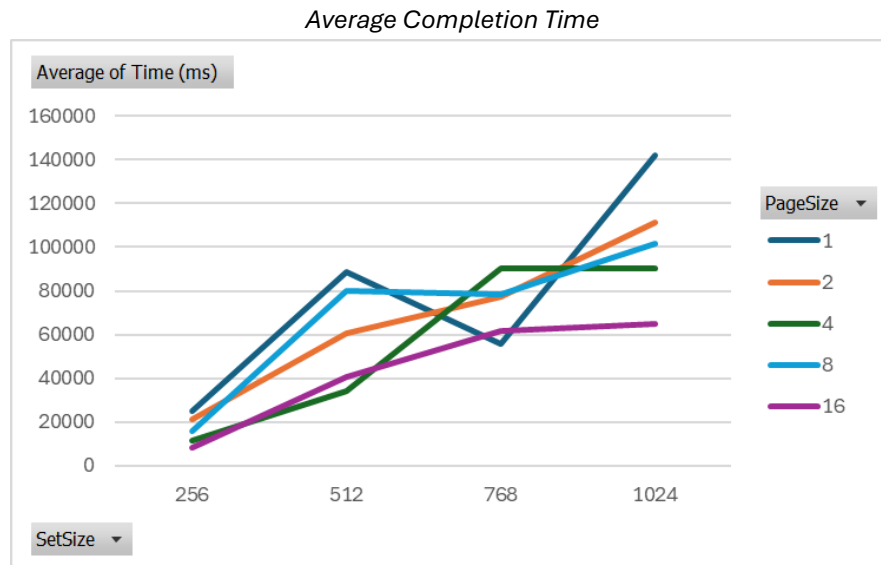
Condition	Description
Page Size	The size of the grid for each page. Ranged from values of 1, 2, 4, 8, and 16.
Set Size	The total number of icons that were searched through and split into pages, ranging from values of 256, 512, 768, and 1024.
Search Time	The time it took to find the target icon. Measured in ms.
Page Changes	The number of page changes that were done before the target icon was found.
Errors	The number of icons that were selected which were not the target.

Along with the above characteristics, additional characteristics regarding the icons themselves were also analyzed.

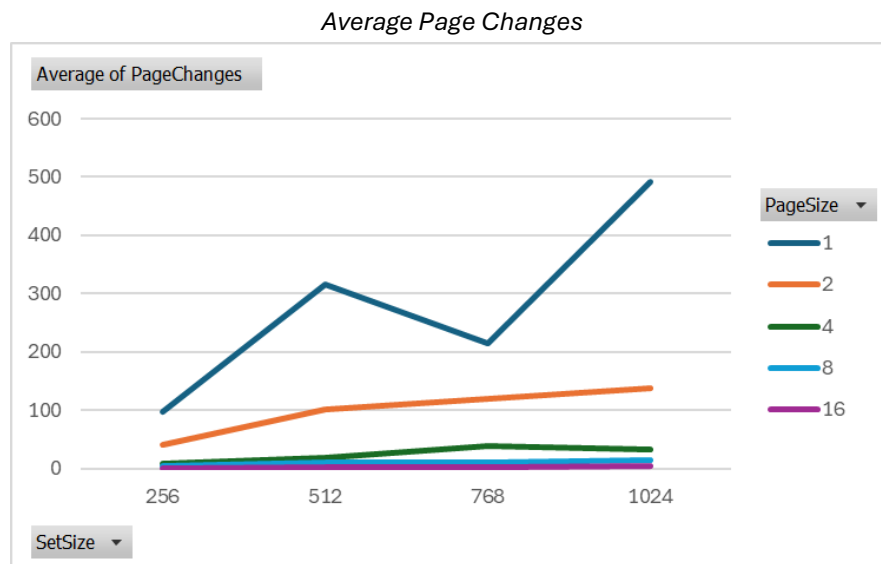
Condition	Description
Whiteness	I found that pokemon with the color white as one of their main or secondary colors, or pokemon with very light color shades, were much harder to find than any of the other colors of pokemon with darker shades. This seemed to be a relevant factor for all page sizes.
Saliency	Saliency is the quality by which an item stands out in comparison to its neighbors. I found that icons that had less protruding/distinct features (wings, tails, spikes, etc.) and were more rounded in shape were much harder to spot than those that had protruding features, particularly in larger page sizes of 8 and 16.

#### 3. Results

Below are two charts which summarize the results of the experiment. The charts show the average search time for each trial and the average page changes for each trial respectively on the y-axis, and the set sizes on the x-axis. Several trends are shown on the chart for each page size. Note that no chart was made for the errors, since it was found that there were little to no errors made during the experiment, showing that this was not a predominant factor worth testing.



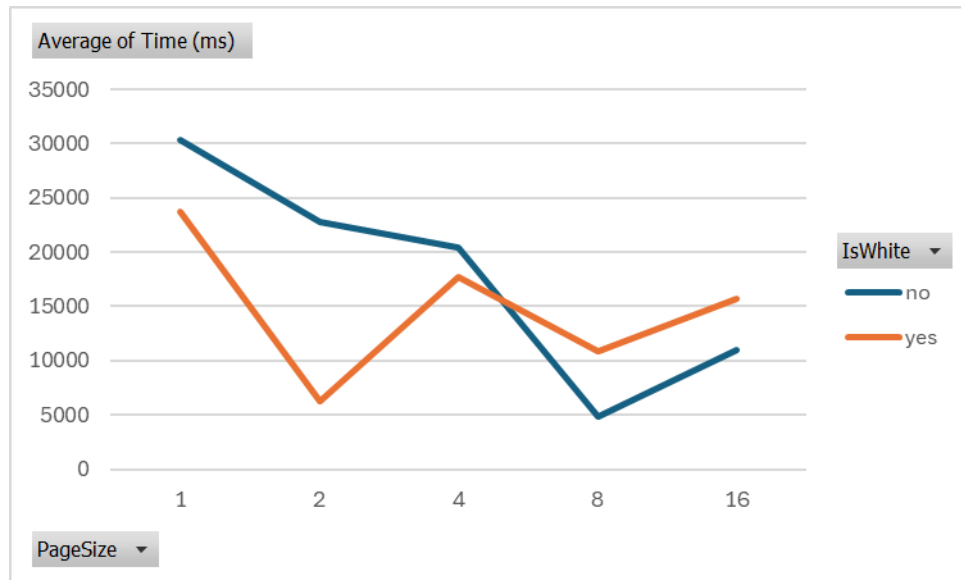
We can see from this chart which page sizes had the shortest completion time on average, and which page sizes had the most. Overall the page sizes with the shortest completion time were 4 and 16, while page sizes with the longest completion time were 1, 2, and 8.



From this we can see how the number of page changes was inversely proportional to the page size, with larger page sizes resulting in a lower amount of page changes.

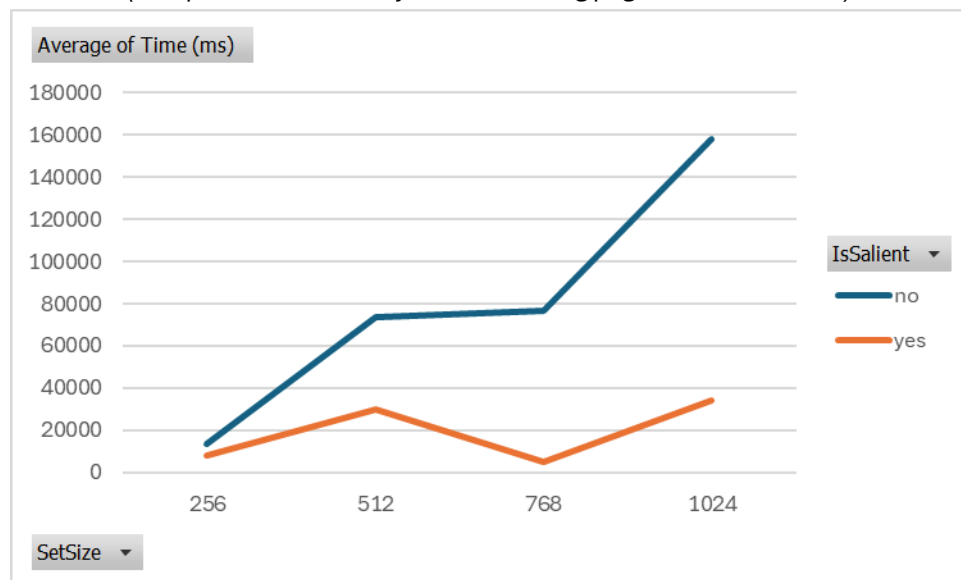
The following charts represent the analysis of the additional conditions that were tested regarding icon characteristics.

*Measure of time to find target w.r.t Whiteness*



We can see from this chart that the whiteness of the icons has a much larger affect with larger page sizes, but is not as significant with smaller page sizes. This is understandable, as smaller page sizes depend less on the icons themselves.

*Measure of time to find target w.r.t Salience  
(Samples here were only collected using page sizes of 8 and 16)*



From this table we can see that the Salience of the icon has a major effect on the search time, as for all set sizes, using page sizes of 8 and 16, there was a significant increase in the search time when the target has less salience, especially for larger set sizes.

#### **4. Discussion**

Overall, set size was found to simply increase the search time of the target proportionally with the size of the set. It otherwise was not found to have other significance.

We can see how the search time for the page sizes differed. With a page size of 1, the search time and page changes were almost directly proportional, which shows how the search time for this page size was directly dependent on the size of the set and the number of pages, and depended very little on the characteristics. Similar things can be said for page sizes of 2 and 4, as the difficulties of spotting an icon due to how it looks in these cases is very little. Page sizes of 1, 2, and 8 were seen to have overall the longest amount of search time on average, with 1 and 2 being long due to the large amount of manual page switching, and 8 being long due to the large amount of visual scanning needed on each page plus the need to still switch between a decently high amount of pages. Page sizes of 4 and 16 had the lowest average search time. Page sizes of 4 seemed to have the best balance between the icons per page and number of pages, as it was still relatively easy to spot the icon within this grid size, to the point where you could still quickly switch pages with little chance of not spotting the icon. Page sizes of 16 had the lowest search time, which shows how visually scanning pages with a large grid is superior to manually switching between pages to find a target.

For testing the whiteness of the icons, it was found that the whiteness for page sizes of 1, 2, and 4 did not play a significant role in finding the icon. This however makes sense, since these grid sizes relied less on the characteristics of the icons for its search time and more on the page switching. For page sizes of 8 and 16 we can see how the whiteness had a larger affect and increased the search time, since these pages rely more on visual scanning rather than page switching. The whiteness being a difficult characteristic to deal with is most likely due to the fact that it blends in with the background of the grid/page.

For testing salience, only page sizes of 8 and 16 were tested. It was found that Salience played a major role in increasing the search time for icons, as the search time drastically increased for larger set sizes. This shows that when it comes to visually scanning, simpler and more rounded shapes are harder to spot within a large grid than shapes with protruding and unique features.

#### **5. Recommendations**

My recommendations to a designer would be to create a visual search system that focuses more on visual scanning rather than page switching. Based on my results, when creating a visual search system it is best to focus on creating a grid that has visually unique icons. Having a large set of icons on a single page is ok as long as the icons are not too simple and basic, and as long as they have good contrast with the background. Overall, having a system with a large page size, but with a smaller set size would be best.