Group members: Aw Ke Fun (A0179536N), Carrie Tan Sui Yi (A0259371X), Dawn Chia Ning (A0259572R), Toh Yung Weii Andrew Roy (A0253172L), Zhdan Artem (A0264788H)

## 1. The Problem

We have chosen to work on improving the ease of locating lost items within the NUS community. There are currently two available lost-and-found solutions used in NUS which are riddled with problems. The current solutions and their problems are elaborated on below:

Current Solution 1: NUS Lost and Found Telegram chat. The problems with it are as follows:
- It is tedious to skim through hundreds of messages to find your lost item.
- Various item descriptions lack information and are ambiguous (eg. exact locations, whether the item is left there or safely kept). An example of such ambiguity is provided below:
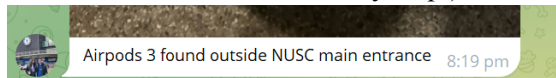


Source: NUS Lost and Found Telegram chat (Screenshot on 5/2/2024, 8.53 pm)
- In this case, the NUSC main entrance can be interpreted as outside Cinnamon College, or outside West Wing. There is thus significant location ambiguity.

Current Solution 2: NUS RepoApp. Its key problems are:
- There are no pictures attached to the reports, so people finding their items may not know if they are making a wasted trip down to get something that isn't theirs to begin with.
- Not only are there no pictures, but the descriptions of the items are ambiguous. For example:



Source: RepoApp (Screenshot on 29/1/2024, 8.39 pm)

There are three main reasons why finding lost items is important:
Firstly, losing items causes emotional distress as belongings become infused with our identities (Jarret, 2013). The slow process of recovering lost items in these traditional platforms compounds these anxieties, negatively affecting the well-being of people who lose these items.

Furthermore, lost items create unnecessary waste as they might be regarded as trash by street cleaners or passers-by. For instance, an estimated 90 million lost school items were expected to contribute to landfill waste in a single year in the UK, emphasizing the impact of unclaimed items on environmental concerns (NotLost Press, 2020).

Lastly, lost items with sensitive information, such as ID or access cards, pose a safety risk. Specifically, the delay between finding and returning these items increases the potential for misuse and breaches of privacy, creating security concerns.

Taken together, we have illustrated how a better lost-and-found matching system would tackle the problems of emotional distress, waste production as well as community safety.

## 2. How Our Application Solves the Problem

Our application aims to streamline the process of locating lost items or reporting found items within the NUS community. We address issues with existing Lost and Found solutions (RepoApp and Lost and Found Telegram chat) by mitigating two specific problems, ultimately working to prevent the challenge of lost items.

Problem 1: It is tedious to go through various reports of missing items to find *your* item

Our app allows users to locate their specific item by providing a brief description (e.g., a green water bottle). Similar items are automatically grouped, and the search results display items fitting the user's description. This simplifies the search for those reclaiming lost items and those trying to find owners.

Problem 2: Ambiguity

To deal with the problem of object ambiguity (ie. not knowing if the reported lost item is yours), pictures will be required when reporting lost items, which prevents users from making a trip down the location just to realise that the item that was reported was not theirs. Question prompts are also created for more detailed reports of missing items (eg. are the items left at their original spot or brought back with the founder for safekeeping?)

The application will also feature specific location pins within the NUS campus to prevent location ambiguity. This will be similar to Google Maps where exact coordinates of the items can be provided to locate the item.

## 3. The Algorithm

What is required of the algorithm can be summarised by the following flowchart:
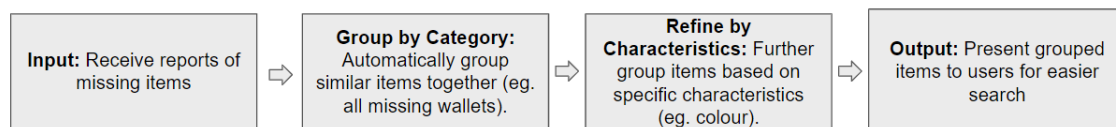


To achieve this, we can use the existing image database from the NUS Lost and Found Telegram group chat. By employing algorithms and models like You Only Look Once (YOLO) as provided on GitHub by Ultralyrics, we can identify and categorize common items such as water bottles, phones, and cards. This model, known for its accuracy in object detection and classification, can also be enhanced to include more specific details like colour, enabling greater accuracy in subcategories. This approach allows for the identification of specific items, such as "purple water bottles."

Additionally, a search algorithm is required for users to search for their lost items within the database. Since we will likely have hundreds of elements, we can use binary search instead of linear search, reducing the time required. Binary search in Java and Python can be found on the freeCodeCamp website.

To construct our algorithm, a good grasp of coding languages like Python or Java is essential. This knowledge enables us to understand the algorithm's workings and customize parameters to meet our requirements.

## 4. Potential Impact of the Application

We foresee the application being by the NUS community/anyone who visits NUS when a lost and found report needs to be made. Emphasizing efficiency over profit, we prioritize a quick, user-friendly interface for a seamless experience.

Unfortunately, there are some issues that we may face:
- The sorting algorithm's precision is limited. Descriptions may be imprecise or subjective, for instance, a turquoise bottle may be labelled as "green" due to the subjectivity of colours, causing difficulty for owners trying to locate their items.
- Furthermore, there is an absence of a designated storage location for lost items, resulting in the possibility of items being relocated from their reported locations.

**References:**

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