Group Project 3: Determining the best combination (Due Friday 17 November at 23:59)
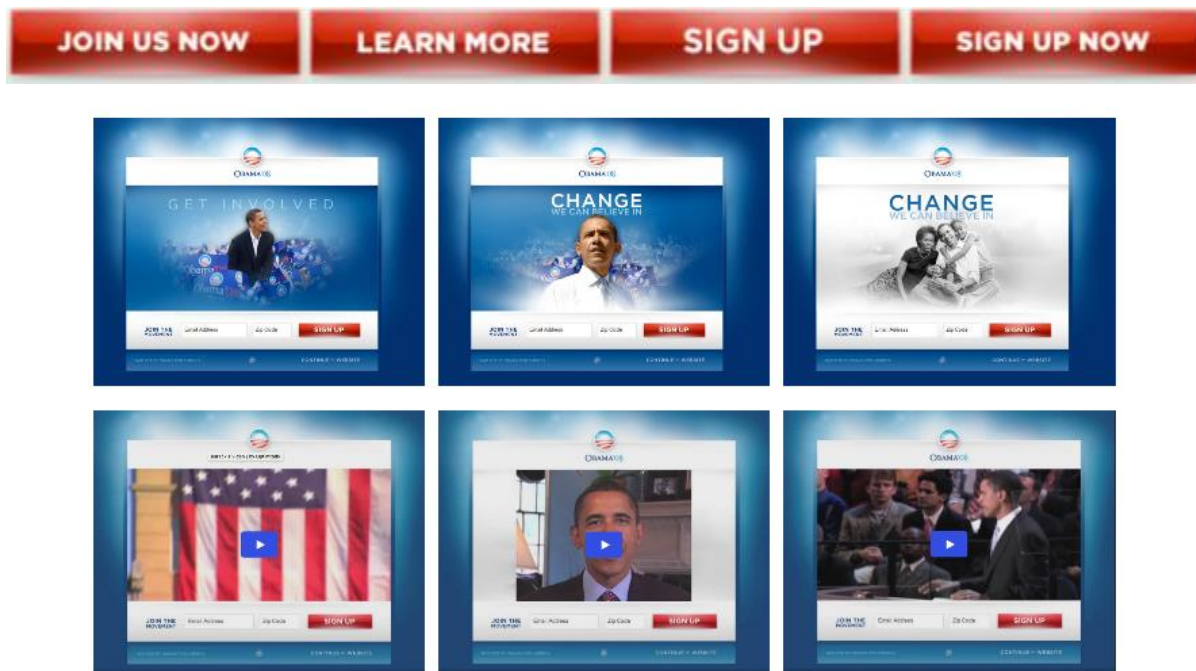
This project is based on a case study of Obama's fundraising campaign.[1] The campaign team experimented with two parts of the splash page of their fundraising website: the "Media" section at the top and the call-to-action "Button".

They tried 4 buttons and 6 different media (3 images and 3 videos) as below.

[1]https://blog.optimizely.com/2010/11/29/how-obama-raised-60-million-by-running-a-simple-experiment/

Together, this gave a total of 24 different combinations that they could have used. They wished to figure out which combination gives the highest sign up rate (the greatest number of clicks).

For this project, you will perform something similar. As with Obama's campaign, you have a total of 24 combinations/arms to try for your website. Your task is to maximize the number of visitors who sign up to your website. This requires you to figure out which of the 24 arms is the best, in the least amount of tries as possible. You may use whatever algorithm or method you wish to determine the best arm (however, give a short explanation why you selected that algorithm/method). Due to budget/bandwidth, the number of visits to the website is bounded by 100 million, and each time you pull the arm, you see the results of 100 visitors to your website. So, this means that you have a **maximum** of one million pulls.

How to pull the "arms"

Step 1: **Be connected to NUS wifi, or VPN**. You may follow the instructions here to connect via VPN.

Step 2: **Make sure the file "server_pull.py" is in the same working directory as your code**. For example, in the case of the sample code "pull_example.ipynb" we provide, make sure both "server_pull.py" and "pull_example.ipynb" are in the same folder.

Step 3: Use the function "output = pull('<your_user_name>' , '<your_password>', <arm to pull>). For example, if your user name is "test_user", and password is "aaaaaaaa", and you wish to pull arm 2, you would type "output = pull('test_user','aaaaaaaa',2)".

Interpreting the output

The output that you get will be a dictionary: {'Arm': '2', 'NetReward': 455, 'Pull': 30, 'Reward': 22}.

Arm: The arm that you pulled. In this case, you pulled arm 2.

Net Reward: The total reward up to the current pull. In this case, your total reward so far is 455.

Pull: How many times you have pulled. In this case, this is your 30th pull. You should not go beyond 1 million pulls.

Reward: Reward from current pull. In this case, your reward is 22, where the maximum is 100.

Username and Password

Each group will be allocated a username and password. This is to prevent collaboration between groups. Note that the best arm for each group is different. If your group was not allocated a username and password, please email Xinyu and Tim at xinyu_hou@u.nus.edu or tim.anthony@u.nus.edu.

Write a report, detailing the method that you used, and the results that you got by using your method. The maximum length of the report is 4 pages, not including possible appendixes. Please have the names and the student numbers on the cover page, **as well as your username**. You may use either R or Python (with an LLM such as ChatGPT, please include your prompt in the submission). Submit 2 files on Canvas: **1) your report in pdf, and 2) code in html, one submission per group.** Please do not zip them.