**Bonus Question Q1**

**Fundamental principles of flow cytometry**

A flow cytometry test is done by measuring the fluorescence intensity generated by labeled antibodies specific to given proteins in/on different cells or ligands. The principle of flow cytometry is the passage of fluorescently-labelled cells in streams in front of a laser to be detected for analysis.

**Step-by-step process**

1. Sample collection: Getting the target cells
2. Cell labelling: Labelling cells with antibodies or dyes
3. Sample Injection: Injecting the labelled cell into the flow cytometer system
4. Hydrodynamic Focusing: Create a narrow cell stream using sheath fluid that passes through the laser.
5. Laser Excitation: As cells pass through laser beams, the cells(fluorochromes) emit fluorescent light.
6. Detect Light and Fluorescent Signal: Measure forward scatter (FSC) and side scatter (SSC), and measure the emitted fluorescent signals using detectors.
7. Analyze Data: Analyze data using software and programming languages including FlowJo, FCS Express, Flowing Software, Python, Matlab. The analysis of flow cytometry is often done to identify cell populations and disease detection.

Some common applications of flow cytometry in scientific and clinical settings include Immunology, Cancer Research, Stem Cell Research, Cell Biology, Immunophenotyping, Virology, Pharmaceutical Research, Genomics Studies, Clinical Diagnostics, Functional Assays.

**Bonus Questions Q2**

Judging from the figure below, there is a clear difference between the color of the cells. If the colors are actually different as it shows in the figure, convolutional neural network can work well in such data. If the color of the cells is the same, then clustering algorithms such as K-nearest neighbors or K-means clustering can work well given the data are actually clustered quite well.