SpaceCode Hackathon- Team Celicia

Question 1:

1. **Problem Statement :** By training the model on original Training Sample provided, even though the overall accuracy was 99%, the accuracy for pulsar was just **68%.**
2. **Solution Approach:** We constructed a more **balanced** Training Dataset by **Undersampling** the majority class ie; Nonpulsar images. After careful analysis, we deployed a CNN model with the ratio of Nonpulsar to Pulsar images in training data as 1.0765:1.
3. **Results:**

|  |  |  |  |
| --- | --- | --- | --- |
| Input Format | Pulsar Accuracy | Non-Pulsar Accuracy | Total Accuracy |
| Images | **93 %** | 97 % | 97% |
| CSV | **97%** | 97% | 97% |

Question 2:

**Solution Approach:**

1. Solved using Scipy Library, thereby optimising strain vs time wave function, predicted a sinusoidal wave and found the respective masses’ parameters.
2. Used PyCBC library, (a Python module for gravitational wave functions). When given the input of strain vs time, it predicted the masses.
3. The above two require an estimated parameter to determine the accurate ones.
4. Another attempt is to differentiate strain wrt time to get Fgw and double differentiating strain wrt time gives Fgm. Then we can substitute in formula and arrive at masses.

**Results:**

1. Estimated Masses for data1.csv --- [32.5502721 47.5502721]
2. Estimated Masses for data2.csv --- [33.05936821 48.05936821]
3. Estimated Masses for data3.csv --- [31.13451232 46.13451232]