**Logo

Description automatically generated**

**San Francisco Bay University**

**CS483 - Fundamentals of Artificial Intelligence**

**Homework Assignment #5**

**Due day: 8/6/2022**

**Instruction:**

1. **Push the source code to Github**
2. **Overdue homework submission could not be accepted.**
3. **Take academic honesty and integrity seriously (Zero Tolerance of Cheating & Plagiarism)**
4. Create random forest based on the following dataset in **bootstrapping** method taking the recommended number of subset selection (*e.g. sqrt(n)*) on the handouts as reference. And then write Python function to compare with your hand-analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID** | **Red** | **Green** | **Blue** | **Size (cm)** | **Fruit (Label)** |
| **0** | **1** | **0** | **0** | **7** | **Apple** |
| **1** | **0** | **1** | **0** | **20** | **Water Melon** |
| **2** | **1** | **0** | **0** | **1** | **Cherry** |
| **3** | **0** | **1** | **0** | **7.5** | **Apple** |
| **4** | **1** | **0** | **0** | **1** | **Strawberry** |
| **5** | **1** | **0** | **0** | **0.8** | **Cherry** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Red** | **Green** | **Blue** | **Size (cm)** | **Fruit (Label)** |  | **ID** | **Condition List** |
| **0** | **1** | **0** | **0** | **7** | **Apple** |  | **0** | **Red?** |
| **1** | **0** | **1** | **0** | **20** | **Water Melon** |  | **1** | **Green?** |
| **2** | **1** | **0** | **0** | **1** | **Cherry** |  | **2** | **Size <= 1?** |
| **3** | **0** | **1** | **0** | **7.5** | **Apple** |  | **3** | **Size <= 10?** |
| **4** | **1** | **0** | **0** | **1** | **Strawberry** |  | **4** | **Size > 10?** |
| **5** | **1** | **0** | **0** | **0.8** | **Cherry** |  |  |  |

Step1 Randomly create bootstrapping subsets from training set; and randomly take sqrt(n) = sqrt(6) = 3 features from condition list 0 ~ 5 for each Btstrp

|  |  |  |
| --- | --- | --- |
| **Btstrp1** | **Btstrp2** | **Btstrp3** |
| 2 | 3 | 0 |
| 3 | 3 | 3 |
| 2 | 4 | 3 |
| 1 | 5 | 3 |
| 3 | 3 | 0 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| n=5 |  |  |  |  |
| 3 features from condition list |  | **CL Btstrp1** | **CL Btstrp2** | **CL Btstrp3** |
|  |  | 2 | 3 | 3 |
|  |  | 2 | 4 | 5 |
|  |  | 3 | 1 | 4 |

1. Given a function *,* find max *f(x)* value if *x* ∈ [-2, 2] in Python program by genetic algorithm, considering 1-digit precision of fractional decimal *x*. And then verify your program running result by the function plot curve in Python or Excel

*\*Notice that in your answer sheet, 1st iteration hand-calculation must be shown including encoding, fitness function, population size determination, Cmin value for parent selection in Roulette Wheel method, crossover rate/mutation rate selections, and the number of evolution generations as termination condition*