**DSL Types**: int, int[], int[][], String, String[] (total: 5)

**Property Predicates List (P):** list of elementary functions with number of arguments not more than 2. For example, f(T, T)→ R where T in [Types] and R in [Types + boolean].

**Target function (f):** f(i1, …, iN) → (o1, .., oM)

**I/O dataset (D)**: data in JSON format (is NOT participated in learning)

**Function Test Vector (T [256])**: positive/negative test representation of function based on dataset

|  |  |
| --- | --- |
| **#** | **true/false** |
| 1 |  |
|  | … |
| n |  |

**Property Result Vector (R [4096]):** execution representation of dataset properties based on f

**Position Vector (S [256])**: 0 – is input, 1 – is output

**Dependencies:**

**NN predication:** (T, R) → f

**NN learning:** (T, R) → f’, P’



Appendix A

|  |  |  |  |
| --- | --- | --- | --- |
| **Property Type** | **Constant** | **Property predicate (Java)** | **Description** |
| **Level 1** |  |  |  |
| (String) -> boolean | () | i == null | is null? |
| (String) -> boolean | (String) | i.contains(",") | contains comma? |
| (String) -> boolean | (String) | i.matches(".\*\\d.\*") | contains digits? |
| (String) -> boolean | (String) | i.matches(".\*[a-zA-Z].\*") | contains letters? |
| (String) -> (String) |  | i.toUpperCase() | to uppercase |
| (int) -> boolean | (int) | i == 0 | is zero? |
| (int) -> boolean | (int) | i < 0 | is negative? |
| (int) -> boolean | (int) | 9 < i | is large integer? |
| (String, String) -> boolean | () | i.equals(o) | input equals output? |
| (String, String) -> boolean | () | o.startsWith(i) | output starts with input? |
| (String, String) -> boolean | () | i.endsWith(o) | input ends with output? |
| (String, String) -> boolean | () | i.equals(i.toUpperCase()) | is uppercase? |
| (String) -> boolean | (int) | i.length() == 0 | is empty? |
| (String) -> boolean | (int) | i.length() == 1 | is single char? |
| (int) -> boolean | (int, int) | 0 < i && i <= 3 | is small integer? |
| (int) -> boolean | (int, int) | 3 < i && i <= 9 | is medium integer? |
| (int, String) -> boolean | () | i < o.length() | is less than output length? |
| (int, String) -> boolean | () | i == o.length() | is equal to output length? |
| (String, String) -> boolean | () | o != null ? o.contains(i) : false | output contains input? |
| (String, String) -> boolean | () | o.toLowerCase().contains(i.toLowerCase()) | output contains input ignoring case? |
| (String, String) -> boolean | () | i.toLowerCase().equals(o.toLowerCase()) | input equals output ignoring case? |
| (String, String) -> boolean | () | i.length() == o.length() | input same length as output? |
| (String, String) -> boolean | () | i.length() < o.length() | input shorter than output? |
| (int, String) -> boolean | (int) | Math.abs(i - o.length()) <= 1 | is very close to output length? |
| (int, String) -> boolean | (int) | Math.abs(i - o.length()) <= 3 | is close to output length? |
| (int[], int) -> boolean | () | Arrays.stream(i).sum() <= o | is sum of array less then output? |

 



