CS639A: Program Analysis, Verification And Testing
Users Online : 14

Assignment #1: Abstract Syntax Tree Analysis

Submitted on 22/8/2021 12:38

Instructions

- You are given an extra 10 minutes after due time to submit your assignment.
- However, please note that any submissions made after the due time are marked as late submissions.

Assignment #1: Abstract Syntax Tree Analysis

Question:

Assignment 1: Abstract Syntax Tree Analysis

This assignment is to be implemented in **one** person team.

Objective

Use the **ast2json** tool to dump the Abstract Syntax Tree (AST) of a small python program. The tool will dump the AST ir **JSON** format. Write a tool in your chosen language which will take this AST as input and print (1) all the assignment statements, (2) all branch conditions and loop conditions in the original python program.

Your implementation should be clear, well-commented and modular, as you will extend this tool in the subsequent assignments.

Input

You can use a python program as given below:

```
# Copute Factorial Of A Number

num = 5
factorial = 1

if num < 0:
    print("cannot compute factorial for negative numbers")
elif num == 0:
    print("The factorial of 0 is 1")
else:
   for i in range(1,num + 1):
       factorial = factorial*i
       print("The factorial of",num,"is",factorial)
```

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Output

Assignment Statements:
num = 5
factorial = 1
num = num - 1
factorial = factorial*i

Branch Conditions:
num < 0
num == 0

Loop Conditions:
i in range(1,num + 1)
num > 0

Tools

Students will have to use ast2json to implement their analysis.

Deliverables

The source code of your implementation (you can use any language of your choice).
A set of test cases (at least 5) with expected output.
A **Readme** file (txt/pdf/doc/docx) which will give a short report (half to one page maximum) on how you accomplished this task and how to build and run your source on any input python file.
A shell script named "run" which will take a python file as input, invoke **ast2json** to dump the corresponding AST and finally invoke your tool to print the required output (assignments, branch and loop conditions).

The quality of all the above would affect your marks.

Submission Format

Your submisssion **MUST** be in the following format:

The submission should be a **zip** file.
The zip file should be named as **assignment_"number"_"Roll-of-student"**. Eg. assignment_1_201225.zip
The zip file should contain (1) a directory named **source** which will contain the source code, (2) a directory named **testcases** which will contain the test cases written by you and the corresponding outputs in separate text files, (3) a **Readme** file (txt/pdf/doc/docx), and (4) a shell script named "run" which will take a python file as input, invoke **ast2json** dump the corresponding AST and finally invoke your tool to print the required output (assignments, branch and loop conditions).

Please note that your submission may **NOT** be graded if you do not follow the format. Furthermore, we will use the **Readme** file provided by you to build and run your code. Therefore, please make sure that the Readme is clear. We

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Before doing anything "extra" (which might fetch bonus marks), first complete the basic expectations from your implementation.
Program analysis tools are expected to display their results in an user-friendly manner; a user would never like to use a tool that simply spits out a bunch of numbers. So, display the results from your tool suitably.

Uploaded Files:

assignment_1_21111037.zip

Grades:

Marks: 30

The program did not pass any of our test cases.

Feedback: At the time of viva when modifying the testcase program was not running correctly in some cases.