San Jose State University - Computer Engineering Department

Course Name: CMPE287 – Software Quality Testing

Instructor: Jerry Gao, Ph.D.
Homework #1:
Semester: Fall 2019
Posted date: 8/22/2019 Due date: 9/19/2019

Question #1: Basic Concepts (20%)

Reading chapters (From 1 to 5) and paper reading #1 and #2:

a. (4%) What is the challenges in testing AI software? (three points)
b. (4%) Why software testing is so hard? (Hint: three points. Please read the given paper)
c. (4%) What are three major challenges in testing software components?
d. (4%) Identify the three major differences between white-box testing and black-box testing.
e. (4%) List vendor-oriented test processes for reusable components.

Reference papers:

Paper #1: What Is Software Testing? And Why Is It So Hard
http://orion.lnu.se/pub/education/course/1DV404/ht12/filer/f02/papers/What%20Is%20Software%20Testing%20and%20Why%20it%20it%20so%20Hard.pdf

Paper #2: Jerry Gao, et al. "What is AI Software Testing? and Why"
https://www.researchgate.net/publication/331730498_What_is_AI_Software_Testing_and_Why

Question #2: Equivalence Partitioning Testing Questions. (20%)

Assume you have been asked to use Equivalence Partitioning method to check the ATM machine login function regarding to PIN number validation. Here are some detailed requirements:

Users must use valid ATM card and enter a correct PIN number to access their accounts. Otherwise, a rejection message will be displayed to them.

Here are some specification descriptions relating to a valid PIN number.

- Each valid PIN number must be formed with letters ('a' to 'z) and digitals (0-6)
- Each PIN must include at least one lower-case letter.
- Each PIN is acceptable if it includes no special chars from the following list:
  - &. *, %, $, #
- The length of each valid PIN must be in the range from 10 to 16.

Whenever an invalid PIN is entered, one of following messages will be displayed: "Incorrect Password" - This suggests that a PIN (entered by a user) is valid but not correct.

"Invalidated Password"- This suggests that a PIN (entered by a user) is invalid.

a) Please list your identified equivalence classes when you testing this function, and present them using a table (or a diagram). (12%)
b) Based on these equivalence classes identify and present test cases in a table. (13%)

Question #3: Boundary Value Testing (20%)

Please use the boundary value analysis method to derive a set of black-box test cases for the following function Z(X,Y) by applying the boundary value analysis criteria. Please make sure to consider all input data and expected output data in a two-dimensional space.

$$
Z(X, Y) = \begin{cases} X + Y + 1 & \text{when } 6 < X \leq 10 \text{ and } 20 \leq Y < 35 \\ \text{Undefined} & \text{when } X = 6 \text{ and } Y = 0 \\ 2X - 4Y + 5 & \text{when } 0 < X < 6 \text{ and } 3 \leq Y < 10 \\ -1 & \text{Otherwise} \end{cases}
$$

a) Define all boundaries for Z(X, Y) (5%)

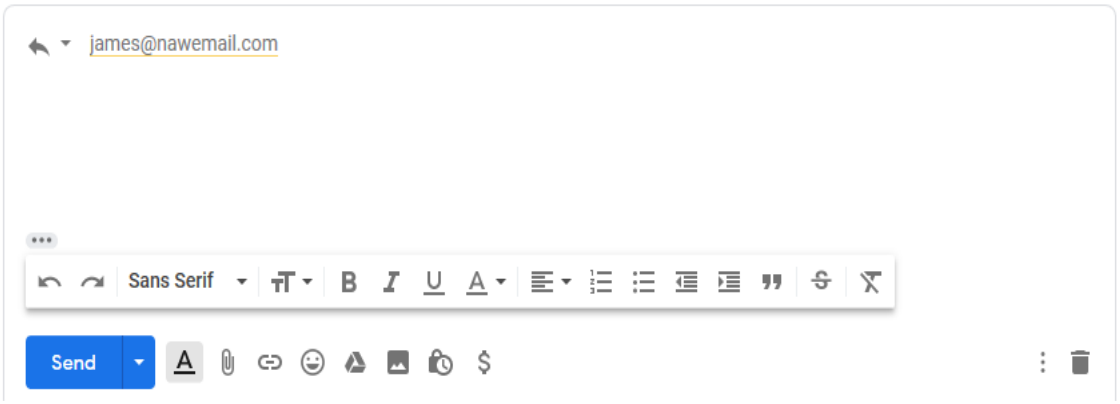
b) Define the boundary values for each boundary (7%). c) Define the test cases for each boundary. (8%)

Question #4: Decision table testing question (20%)

Please use decision table test method to design your tests for the Mail Reply Function in your Gmail software. Please check the given Figure below to consider the related functions and data items in Reply Message Window. Please answer your questions below.
(Note: you need to consider reply mail address, CC and BCC, as well as subject data)

a) Create two decision tables to check the following two functions in sending Gmail message.
- A decision table (Table A) for sending a reply message without attachments. (6%)
- A decision table (Table B) for sending a reply mail with attachments. (6%)

b) Define 5 sample test cases for Table A. (7%)



Question #5: AI testing and AI-based software testing questions (20%)

Please search online to find the answers to the following questions:

a) Search online to find out at least five published papers addressing AI testing issues, methods, models, assessment metrics, and quality assurance standards for AI functions, and list them in a reference list using IEEE conference format. And summarize them and complete the table below (10%).

(Note: Please list the existing references in IEEE paper format)

For each paper, please enter the following information:

- Paper ID
- Issues and challenges (if there is any)
- Testing Methods (if there is any)
- Quality parameters (if there is any)
- Quality process (if there is any)
- Supported testing types and applications

b) Search online to find out at least five existing AI-Based software testing issues, methods, models, and QA metrics, and standards. (10%)

(Note: Please list the existing references in IEEE paper format)

For each paper, please enter the following information:

- Paper ID
- Issues and challenges (if there is any)
- Testing Methods (if there is any)
- Quality parameters (if there is any)
- Quality process (if there is any)
- Supported testing activities and applications