**Aim:** Develop test cases for the project using white box testing and Automated testing with Selenium Automated testing tool

**Theory:**

**1.Define Testing.**

Software testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test.[[1]](https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering/Testing#cite_note-1) Software testing also provides an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. Test techniques include, but are not limited to, the process of executing a program or application with the intent of finding software bugs.

**2.Types of testing techniques**

**1. Unit Testing**: It focuses on the smallest unit of software design. In this we test an individual unit or group of interrelated units. It is often done by programmers by using sample input and observing its corresponding outputs.

**2. Integration Testing:**The objective is to take unit tested components and build a program structure that has been dictated by design.Integration testing is testing in which a group of components are combined to produce output.

Integration testing is of four types: (i) Top down (ii) Bottom up (iii) Sandwich (iv) Big-Bang

**3. Regression Testing:**Every time a new module is added leads to changes in program. This type of testing makes sure that the whole component works properly even after adding components to the complete program.

**4. Smoke Testing:** This test is done to make sure that software under testing is ready or stable for further testing.It is called a smoke test as testing initial pass is done to check if it did not catch the fire or smoked in the initial switch on.

**5. Alpha Testing:** This is a type of validation testing.It is a type of *acceptance testing* which is done before the product is released to customers. It is typically done by QA people.

**6. Beta Testing:** The beta test is conducted at one or more customer sites by the end-user of the software. This version is released for the limited number of users for testing in real time environment

**7. System Testing:**In this the software is tested such that it works fine for different operating system.It is covered under the black box testing technique. In this we just focus on required input and output without focusing on internal working.In this we have security testing, recovery testing , stress testing and performance testing

**8. Stress Testing:**In this we give unfavorable conditions to the system and check how they perform in those conditions.

**9. Performance Testing:** It is designed to test the run-time performance of software within the context of an integrated system.It is used to test speed and effectiveness of a program.

**3.Types of Testing Strategies.**

There are different types of software testing strategies, which are selected by the testers depending upon the nature and size of the software. The commonly used software testing strategies are listed below.

**1.Analytic testing strategy:** This uses formal and informal techniques to access and prioritize risks that arise during software testing. It takes a complete overview of requirements, design, and implementation of objects to determine the motive of testing. In addition, it gathers complete information about the software, targets to be achieved, and the data required for testing the software.

**2.Model-based testing strategy:** This strategy tests the functionality of the software according to the real world scenario (like software functioning in an organization). It recognizes the domain of data and selects suitable test cases according to the probability of errors in that domain.

**3.Methodical testing strategy:** It tests the functions and status of software according to the checklist, which is based on user requirements. This strategy is also used to test the functionality, reliability, usability, and performance of the software.

**4.Process-oriented testing strategy:** It tests the software according to already existing standards such as the IEEE standards. In addition, it checks the functionality of the software by using automated testing tools.

**5.Dynamic testing strategy:** This tests the software after having a collective decision of the testing team. Along with testing, this strategy provides information about the software such as test cases used for testing the errors present in it.

**6.Philosophical testing strategy:** It tests the software assuming that any component of the software can stop functioning anytime. It takes help from software developers, users and systems analysts to test the software.

**4.Compare white box and black box testing techniques**

|  |  |  |
| --- | --- | --- |
| **Criteria** | **Black Box Testing** | **White Box Testing** |
| **Definition** | Black Box Testing is a software testing method in which the internal structure/ design/ implementation of the item being tested is NOT known to the tester | White Box Testing is a software testing method in which the internal structure/ design/ implementation of the item being tested is known to the tester. |
| **Levels Applicable To** | Mainly applicable to higher levels of testing:[Acceptance Testing](http://softwaretestingfundamentals.com/acceptance-testing/)  [System Testing](http://softwaretestingfundamentals.com/system-testing/) | Mainly applicable to lower levels of testing:[Unit Testing](http://softwaretestingfundamentals.com/unit-testing/)  [Integration Testing](http://softwaretestingfundamentals.com/integration-testing/) |
| **Responsibility** | Generally, independent Software Testers | Generally, Software Developers |
| **Programming Knowledge** | Not Required | Required |
| **Implementation Knowledge** | Not Required | Required |
| **Basis for Test Cases** | Requirement Specifications | Detail Design |

**5.Write pseudo code of major functionality of your mini project**

Import pandas as pd

From sklearn import DecisionTreeClassifier

df2=pd.read\_csv(‘SmsSpam.csv’)

for i in range (0,5814):

    m = df2['text'][i]

    m = re.sub('\b[\w\-.]+?@\w+?\.\w{2,4}\b', 'emailadd', df2['text'][i])

    m = re.sub('(http[s]?\S+)|(\w+\.[A-Za-z]{2,4}\S\*)', 'urladd', df2['text'][i])

    m = re.sub('£|\$', 'moneysymbols', df2['text'][i])

   m = re.sub('\b(\+\d{1,2}\s)?\d?[\-(.]?\d{3}\)?[\s.-]?\d{3}[\s.-]?\d{4}\b', 'phoneno', df2['text'][i])

    m = re.sub('\d+(\.\d+)?', 'numbers', df2['text'][i])

    m = re.sub('[^\w\d\s]', ' ', df2['text'][i])

    m = m.lower().split()

    m = m.split()

   m = [ps.stem(word) for word in m if not word in set(stopwords.words('english'))]

    m = ' '.join(m)

    corpus.append(m)

x = cv.fit\_transform(corpus).toarray()

y = df2['type']

y = le.fit\_transform(y)

xtrain, xtest, ytrain, ytest = train\_test\_split(x, y,test\_size= 0.15, random\_state = 0)

dt = DecisionTreeClassifier(random\_state=50)

dt.fit(xtrain, ytrain)

y\_pred\_dt = dt.predict(xtest)

cm = confusion\_matrix(ytest, y\_pred\_dt)

print(cm)

print ("Accuracy : %0.5f \n\n" % accuracy\_score(ytest, dt.predict(xtest)))

xxp=dt.fit(xtrain, ytrain)

pickle.dump(xxp,open('modeldec.pkl','wb'))

model22=pickle.load(open('modeldec.pkl','rb'))

f1=["Free entry in 2 a wkly comp to win FA Cup final tkts 21st May 2005. Text FA to 87121 to receive entry question(std txt rate)T&C's apply 08452810075over18's"]

final=cv.transform(f1).toarray()

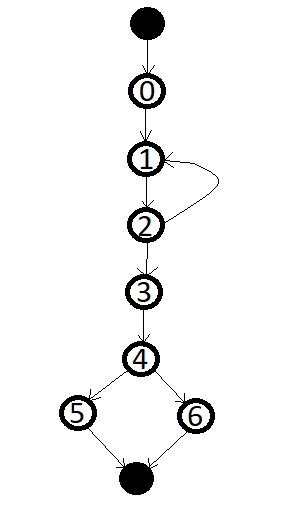
if(model22.predict(final)==0):

    print("Not Spam")

else:

    print("Spam")

**6.Flow Graph**

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**7.Find the cyclomatic complexity of the flow graph**

Cyclomatic Complexity V(G)=No\_of\_Predicate\_Nodes+1

                                                = 2+1

= 3

Cyclomatic Complexity V(G)=E-N+2

                                                = 10-9+2

            = 3

Cyclomatic Complexity V(G)=No\_of\_Bounded\_regions+1

                                                = 2+1

= 3

**8.List all possible paths and write test cases for each path.**

Possible Paths:

**Path P1:**Start - 0 - 1 - 2 - 1 - 2 - 3 - 4 - 5 - End

**Path P2:**Start - 0 - 1 - 2 - 1 - 2 - 3 - 4 - 6 - End

Test Cases:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test Id | Description | Input | Expected Result | Actual Result | Pass/Fail |
| P1 | if(model22.predict(final)==1):    To check if the input is Spam | Message = Free entry in 2 a wkly comp to win FA Cup final tkts 21st May 2005. | Spam | Spam | Pass |
| P2 | if(model22.predict(final)==0):    To check if the input is Not Spam | Message = Hello my friend how's your day? | Not Spam | Not Spam | Pass |

**CONCLUSION:**

From this experiment, we learnt about testing on a project. We understood exactly what is testing and what are the types of testing .We understood the difference between white box testing and black box testing .We applied white box testing on the software for which we calculated the cyclomatic complexity and we also made a flow graph. From the flowgraph we found out the possible paths and then designed test cases for it.