Homework 1 Lab Report - Python

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1. **Problem Statement**

* In the context of this scenario, the purpose of the program is to analyze a diagnostic report that consists of a list of binary numbers of the same length. To start, the program loads the data from the specified file, calculates the gamma rate, epsilon rate, and power consumption values, notifies the user when calculating, and returns the power consumption value. Some of the sources I used for my program’s syntax include GeeksforGeeks, DelftStack, W3Schools, and StackOverflow. I utilized these sources to learn how to cast/convert to an integer, understand loop syntax, and a few other formatting discrepancies. I implemented the logic by recalling knowledge from data analysis and working on a few projects that I’ve implemented in Python.

1. **Input and Output**

The **input** will be presented as a file in the format below. The length of the binary numbers may vary but all binary numbers will have the same length.

A number of binary code

Description automatically generated

The **output** is formatted as below. The loading diagnostics message will appear as the data is loading from the input file. The gamma rate message will appear once the gamma rate is calculated. The same will occur when the epsilon rate is calculated. The power consumption rate will appear once it is calculated. All methods are called in main.

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Description automatically generated

1. **Usage**

To compile and run the program, open the terminal, navigate to the directory using the cd command, and run python script using the file as input by using the python3 command. The loadDiagnostics function takes a single value, which is the name of the file, reads the file in and returns a list of all binary values. The filename is given by command line, allowing interaction with the operating system through command prompts. Therefore, we are able to complete compilation and run the program by typing specific commands rather than using GUI buttons.

1. **Theory**
2. **What is the best datatype to use for the list of numbers?**

The best datatype to use for the list of numbers is a string datatype, as they are easy to manipulate, including breaking apart and recombining into new strings, which is a huge element of the functionality of the program. Personally, I also chose to use strings since I’m more familiar with string manipulation than integer manipulation.

1. **How would this have been different with a strongly typed language?**

In a strongly typed language, we would be required to declare the datatype of the list when first creating the list itself. The datatype would be checked before execution of the program, allowing errors to be detected earlier in the coding process than dynamically typed languages. Python is dynamically typed, meaning python can store items of different types without previous declaration. Therefore, Python does not ensure that a datatype is chosen when declaring a list like Java would insist.