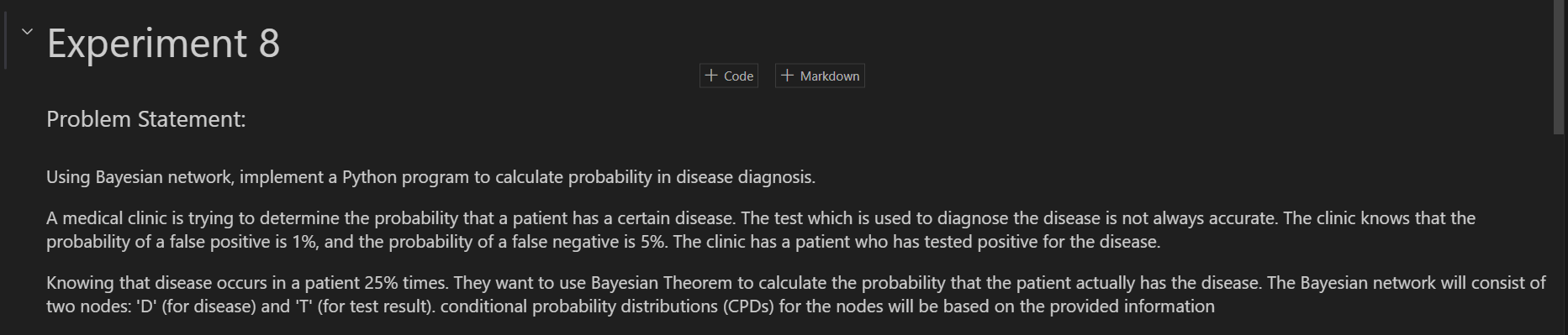
**EXPERIMENT NO. 8**

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| **Student Name and Roll Number:** Piyush Gambhir – 21CSU349 |
| **Semester /Section:** Semester-V – AIML-V-B (AL-3) |
| **Link to Code:** [NCU-Lab-Manual-And-End-Semester-Projects/NCU-CSL347-AAIES-Lab\_Manual at main · Piyush-Gambhir/NCU-Lab-Manual-And-End-Semester-Projects (github.com)](https://github.com/Piyush-Gambhir/NCU-Lab-Manual-And-End-Semester-Projects/tree/main/NCU-CSL347-AAIES-Lab_Manual) |
| **Date:** 30.09.2023 |
| **Faculty Signature:** |
| **Grade:** |

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| **Objective(s):**   * Understand and study Bayesian Network. * Implement Bayesian Network for solving a real-world graph-based problem. |
| **Outcome:**  Students will be familiarized with concepts of Bayesian Network. |
| **Problem Statement:**  Using Bayesian network, implement a Python program to calculate probability in disease diagnosis.  A medical clinic is trying to determine the probability that a patient has a certain disease. They have a test that can be used to diagnose the disease, but the test is not always accurate. The clinic knows that the probability of a false positive is 1%, and the probability of a false negative is 5%. The clinic has a patient who has tested positive for the disease.  They want to use Bayesian Theorem to calculate the probability that the patient actually has the disease. The Bayesian network will consist of two nodes: 'D' (for disease) and 'T' (for test result). conditional probability distributions (CPDs) for the nodes will be based on the provided information |
| **Background Study:**  Bayesian networks, also known as belief networks or probabilistic graphical models, are powerful tools for representing and reasoning about uncertainty in probabilistic systems. They are widely used in various fields, including medical diagnosis, natural language processing, finance, and more. A Bayesian network is a directed acyclic graph (DAG) in which nodes represent random variables, and edges represent probabilistic dependencies between the variables. |
| **Question Bank:**   1. What is a Bayesian Theorem?   The Bayesian Theorem, also known as Bayes' Theorem, is a fundamental concept in probability theory and statistics. It describes the probability of an event occurring based on prior knowledge or information. The theorem mathematically relates the conditional probability of an event A given event B, with the conditional probability of event B given event A, along with the probabilities of events A and B independently.   1. Discuss the applications of Bayesian Theorem?  * Medical Diagnosis: Bayesian methods help in disease diagnosis by incorporating prior probabilities and test results to estimate the probability of a patient having a particular condition. * Spam Filtering: Bayesian algorithms are used in spam email filters, considering word probabilities to determine the likelihood of an email being spam. * Machine Learning: Bayesian networks assist in modeling dependencies between variables, aiding in probabilistic reasoning and prediction tasks. * Natural Language Processing: Bayesian methods are employed in language models, part-of-speech tagging, and sentiment analysis. * Recommendation Systems: Bayesian techniques help in collaborative filtering and content-based recommendation to suggest relevant products or content. * Financial Analysis: Bayesian inference is used in risk assessment, portfolio optimization, and credit scoring. * Weather Forecasting: Bayesian models can integrate historical data and current observations to improve the accuracy of weather predictions. * Fault Diagnosis: In engineering, Bayesian networks aid in diagnosing faults in complex systems by analyzing sensor data and known relationships. * Image Processing: Bayesian techniques enhance image denoising, object recognition, and image segmentation.   Bayesian methods are versatile and applicable in various fields where uncertainty and probabilistic reasoning are involved. |

**Student Work Area**

**Algorithm/Flowchart/Code/Sample Outputs**



A screenshot of a computer program

Description automatically generatedA screenshot of a computer

Description automatically generatedA screenshot of a computer

Description automatically generatedA black screen with colorful text

Description automatically generated