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SMT. INDIRA GANDHI COLLEGE OF ENGINEERING

GHANSOLI, NAVI MUMBAI – 400701

(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)

COMPUTER ENGINEERING DEPARTMENT

ACADEMIC YEAR :- 2021-22(EVEN SEM)

NAME- DEEPAK H CHOURASIYA
ROLL NO - 77
YEAR - TE SEM - VI
BRANCH - COMPUTER

EXPERIMENT NO : 08

TITLE-: IMPLEMENTING BAYESIAN BELIEF NETWORK : BURGLARY ALARM PROBLEM.

Date of Performance	Date of Evaluation	Marks (10)					Sign / Remark
		A	B	C	D	E	
		2	3	2	2	1	
22/03/22	29/03/22						
		Total Marks					

Date:

Date	Experiment	Sign:
22-03-2022	Exp-8: Implementing Bayesian Belief Network: Burglary Alarm Problem	Grade:

Aim: Implement Burglary Alarm Problem, an Bayesian Belief Network.

Theory: A belief network is a graph with the following:

1. Nodes: Set of random variables

2. Directed links: The intuitive meaning of a link from node X to node Y is that X has a direct influence on Y.

3. Each node has a conditional probability table that quantifies the effect that the parent have on the node.

4. The graph has no directed cycles (DAG).

Scenario of Burglary Alarm Problem:

i. You have a new burglar alarm installed at home.

Date:_____

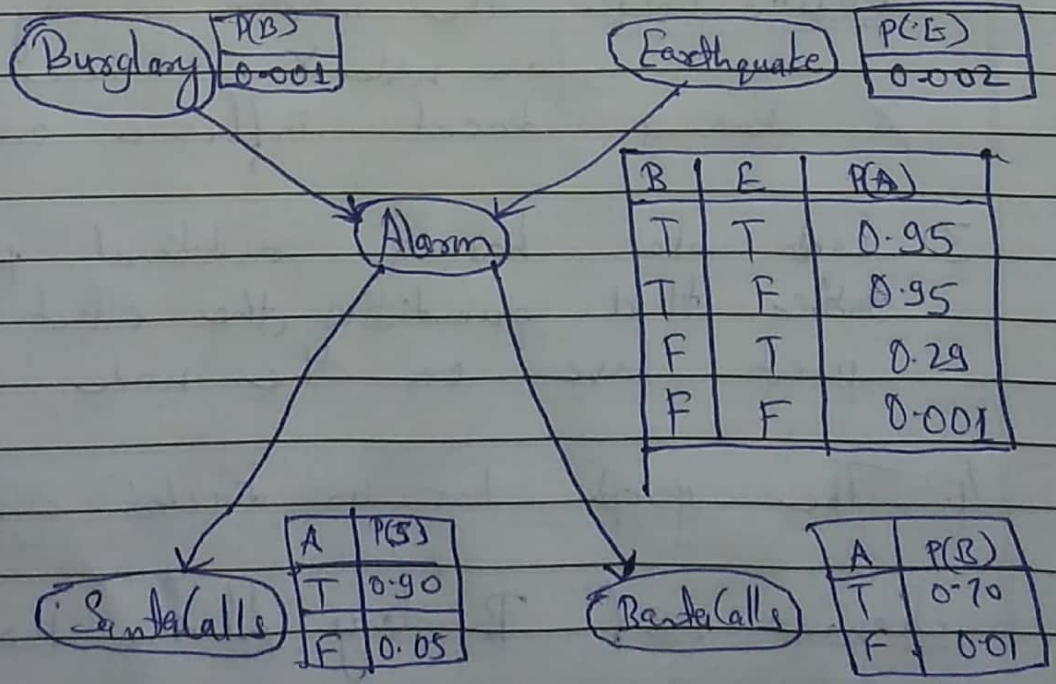
ii. It is fairly reliable at detecting burglary, but also sometimes responds to minor earth quakes.

iii. You have two neighbor, Santa and Banta, who promised to call you at work when they hear the alarm.

iv. Santa always call when he hears the alarm, but sometimes confuses telephone ringing with the alarm and calls too.

v. Banta likes loud music and sometimes misses the alarm.

vi. Given the evidence of who has or has not called, we would like to estimate the probability of a burglary.



Bayesian Network

Date:

The joint probability distribution:

A generic entry in the joint probability distribution $P(x_1, x_2, \ldots, x_n)$ is given by:

$$P(x_1, \ldots, x_n) = \prod_{i=1}^{n} P(x_i \mid \text{Parents}(X_i))$$

The Probability event that the event that alarm has sounded but neither a burglary nor an earthquake has occured, and both Santa and Banta call:

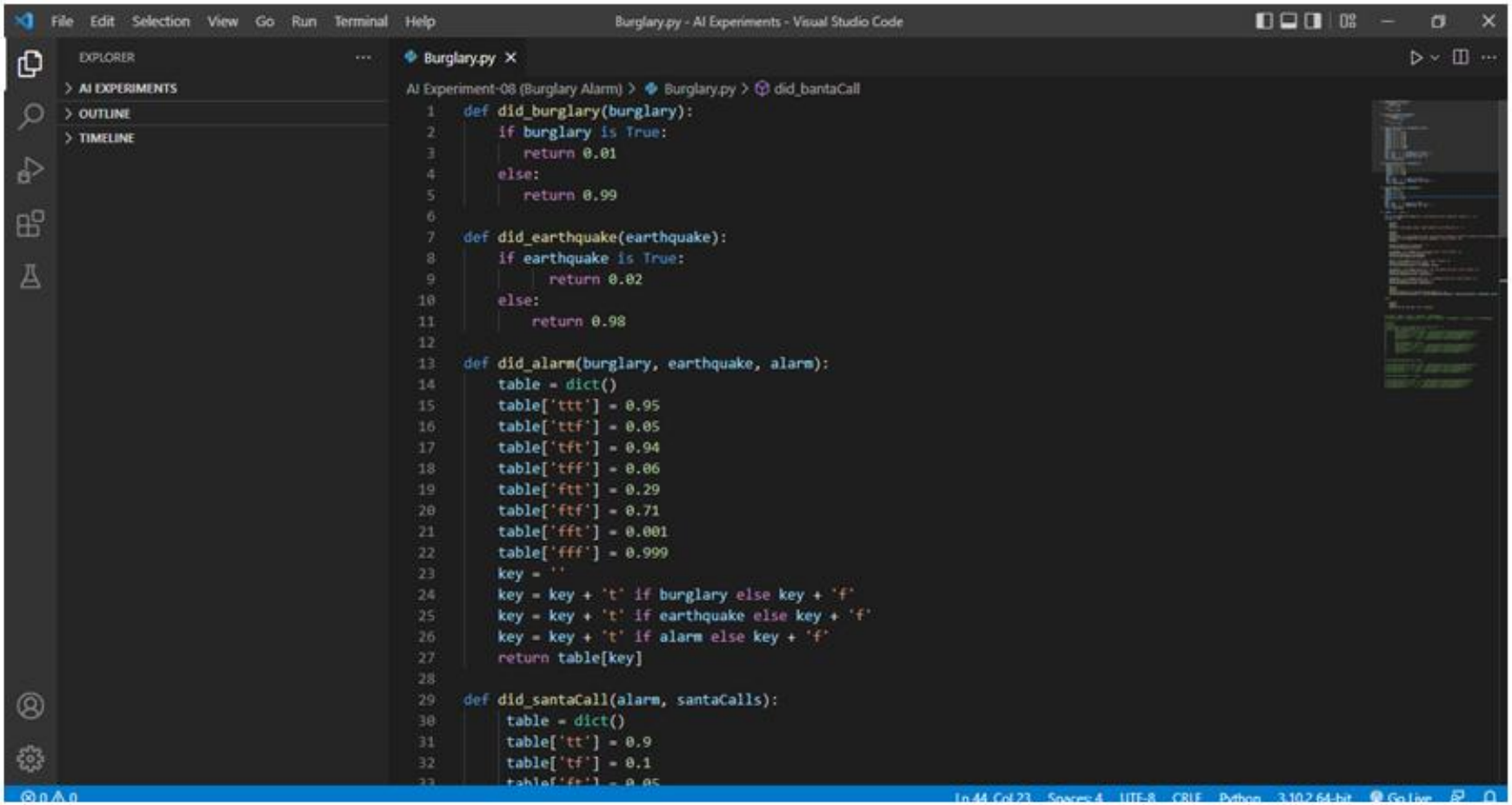
$$P(J \wedge B \wedge A \wedge \neg B \wedge \neg E)$$

$$= P(S|A)\, P(B|A)\, P(A|\neg B \wedge \neg E)\, P(\neg B)\, P(\neg E)$$

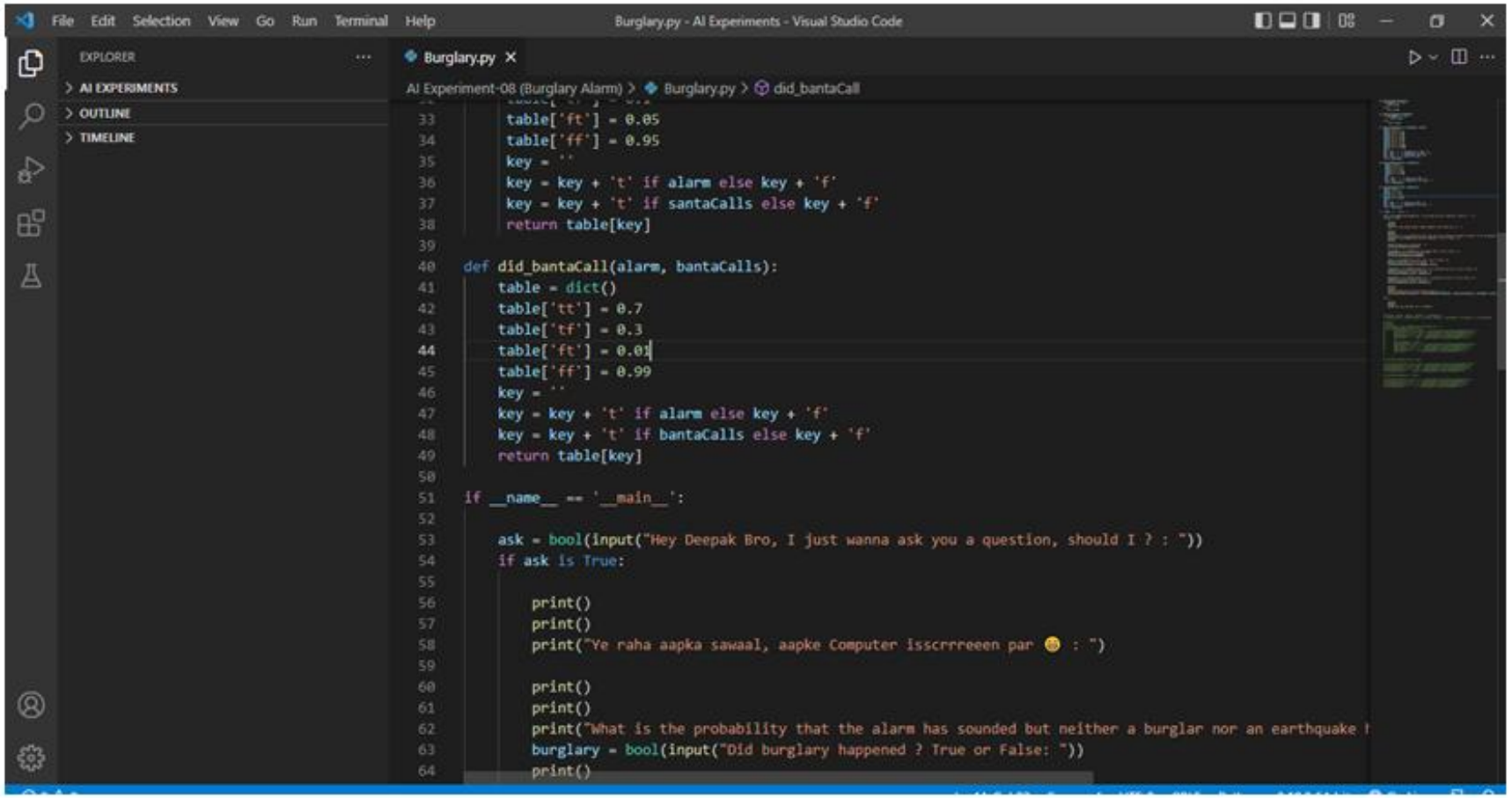
$$= 0.9 \times 0.7 \times 0.001 \times 0.999 \times 0.998$$

$$= \underline{0.00062} \ldots$$

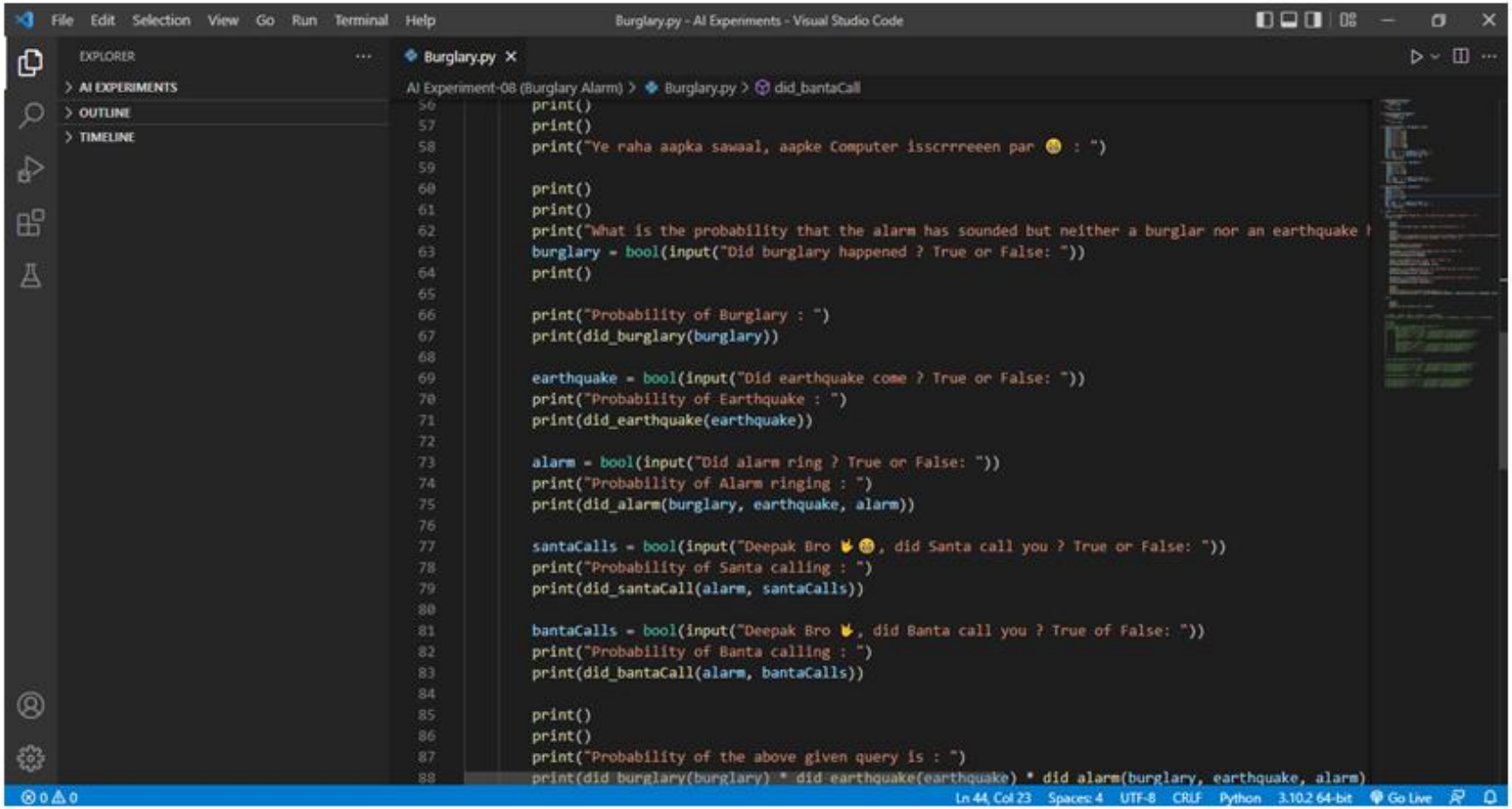
Implementation:



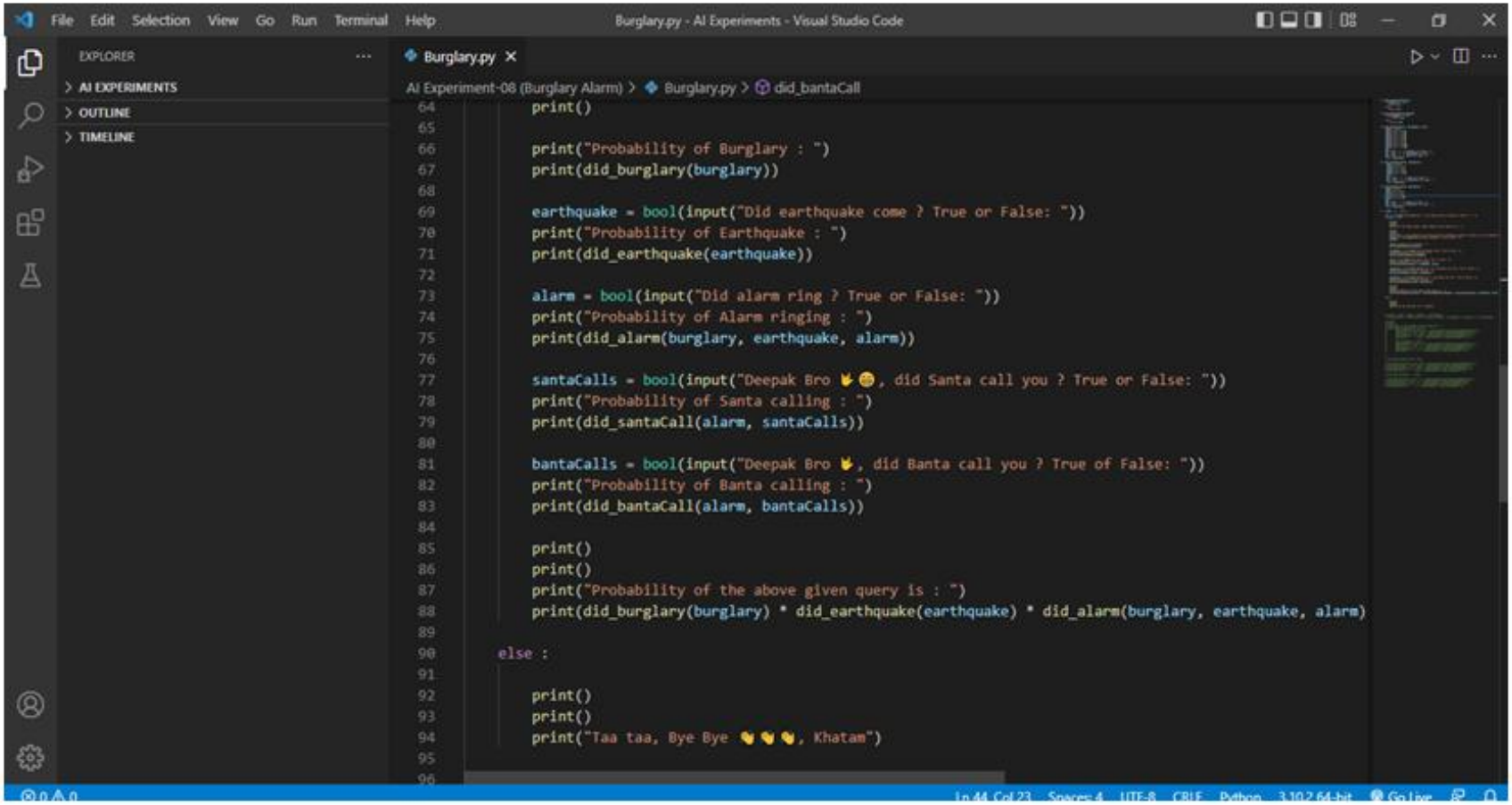
(Implementation Part – 01)



(Implementation Part – 02)

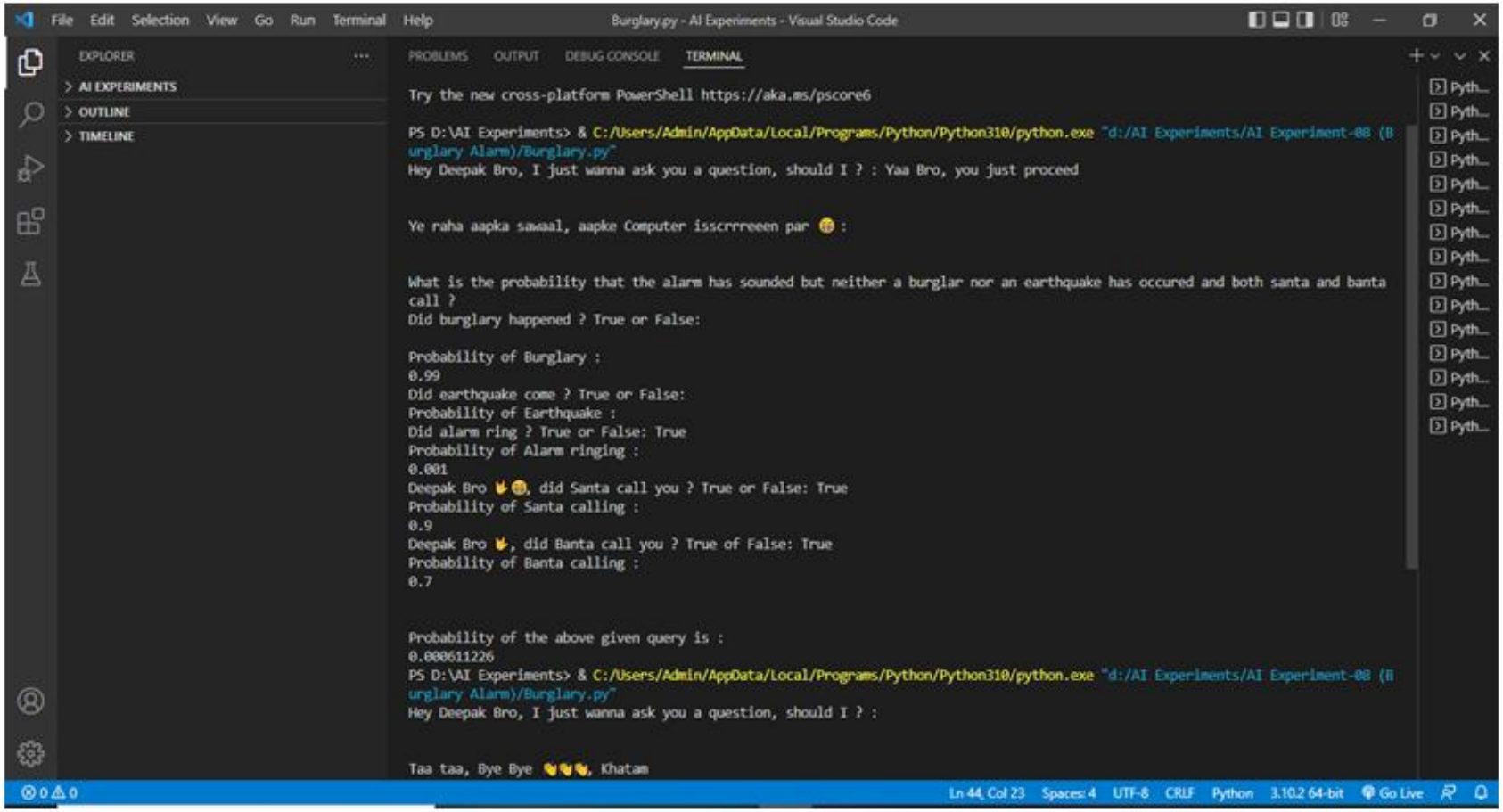


(Implementation Part – 03)



(Implementation Part – 04)

Output:


File Edit Selection View Go Run Terminal Help
Burglary.py - AI Experiments - Visual Studio Code
EXPLORER
AI EXPERIMENTS
OUTLINE
TIMELINE
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
Try the new cross-platform PowerShell https://aka.ms/pscore6
PS D:\AI Experiments> & C:/Users/Admin/AppData/Local/Programs/Python/Python310/python.exe "d:/AI Experiments/AI Experiment-08 (Burglary Alarm)/Burglary.py"
Hey Deepak Bro, I just wanna ask you a question, should I ? : Yaa Bro, you just proceed
Ye raha aapka sawaal, aapke Computer isscrrreeen par :
What is the probability that the alarm has sounded but neither a burglar nor an earthquake has occured and both santa and banta call ?
Did burglary happened ? True or False:
Probability of Burglary :
0.99
Did earthquake come ? True or False:
Probability of Earthquake :
Did alarm ring ? True or False: True
Probability of Alarm ringing :
0.001
Deepak Bro , did Santa call you ? True or False: True
Probability of Santa calling :
0.9
Deepak Bro , did Banta call you ? True of False: True
Probability of Banta calling :
0.7
Probability of the above given query is :
0.000611226
PS D:\AI Experiments> & C:/Users/Admin/AppData/Local/Programs/Python/Python310/python.exe "d:/AI Experiments/AI Experiment-08 (Burglary Alarm)/Burglary.py"
Hey Deepak Bro, I just wanna ask you a question, should I ? :
Taa taa, Bye Bye , Khatam
Ln 44, Col 23 Spaces: 4 UTF-8 CRLF Python 3.10.2 64-bit Go Live

Date:_____

Conclusion: I have successfully implemented and understood about Bayesian Belief Network with an example of Burglary Alarm Problem.