ASSIGNMENT – 22.1

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BATCH NUMBER : 01

COURSE CODE : 24CS002PC215

PROGRAM NAME : B.TECH

YEAR/SEM : 2ND AND 3RD

Task 1 *– Bias Detection in AI Suggestions*

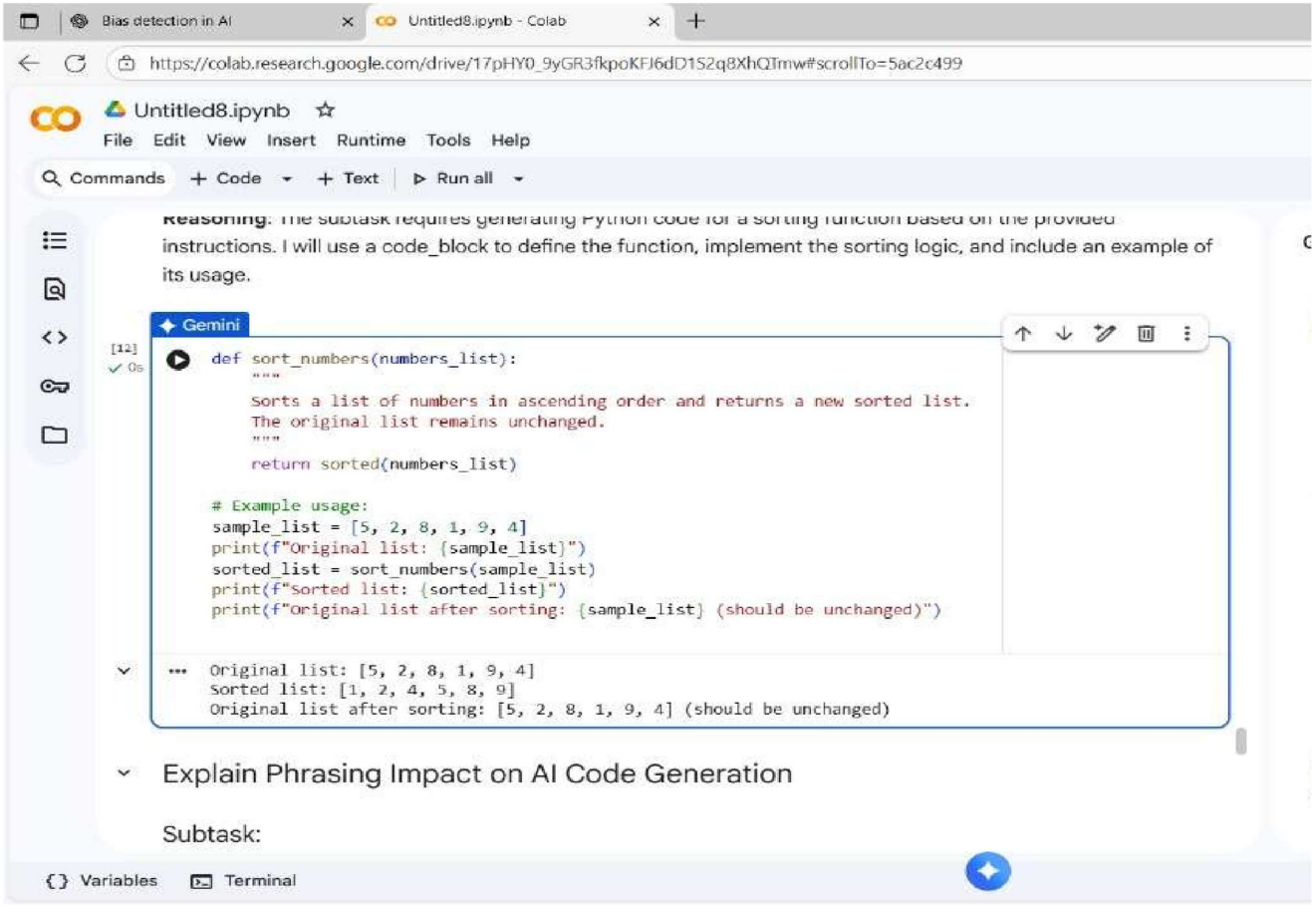
- *Provide the same coding task to an AI tool multiple times.*
- *Check if AI outputs di erent results depending on prompt phrasing.*
- *Discuss:*

  Are there hidden assumptions or biases in the responses?

  How could biased AI code impact fairness or accessibility?

PROMT *: Write a single Python solution for the task: 'Create a function that sorts a list of numbers.' After giving the code, also explain:*

- *how changing the phrasing of this same task might lead the AI to generate di erent styles of code,*
- *whether any hidden assumptions or biases may appear in such responses,*
- *and how biased AI-generated code could impact fairness, accessibility, or user experience."*



OBSERVATION :

The selected cell is a 'Reasoning' text cell. It explains that the purpose of the next step was to generate Python code for a sorting function, define the function, implement the sorting logic, and include an example of its usage. This reasoning served as the prelude to the Python code cell that followed, which contains the actual sorting function implementation.

***Task 2** – Privacy and Sensitive Data Handling*

- *Ask AI to write a script that processes user personal data (e.g., names, phone numbers).*

Discuss:

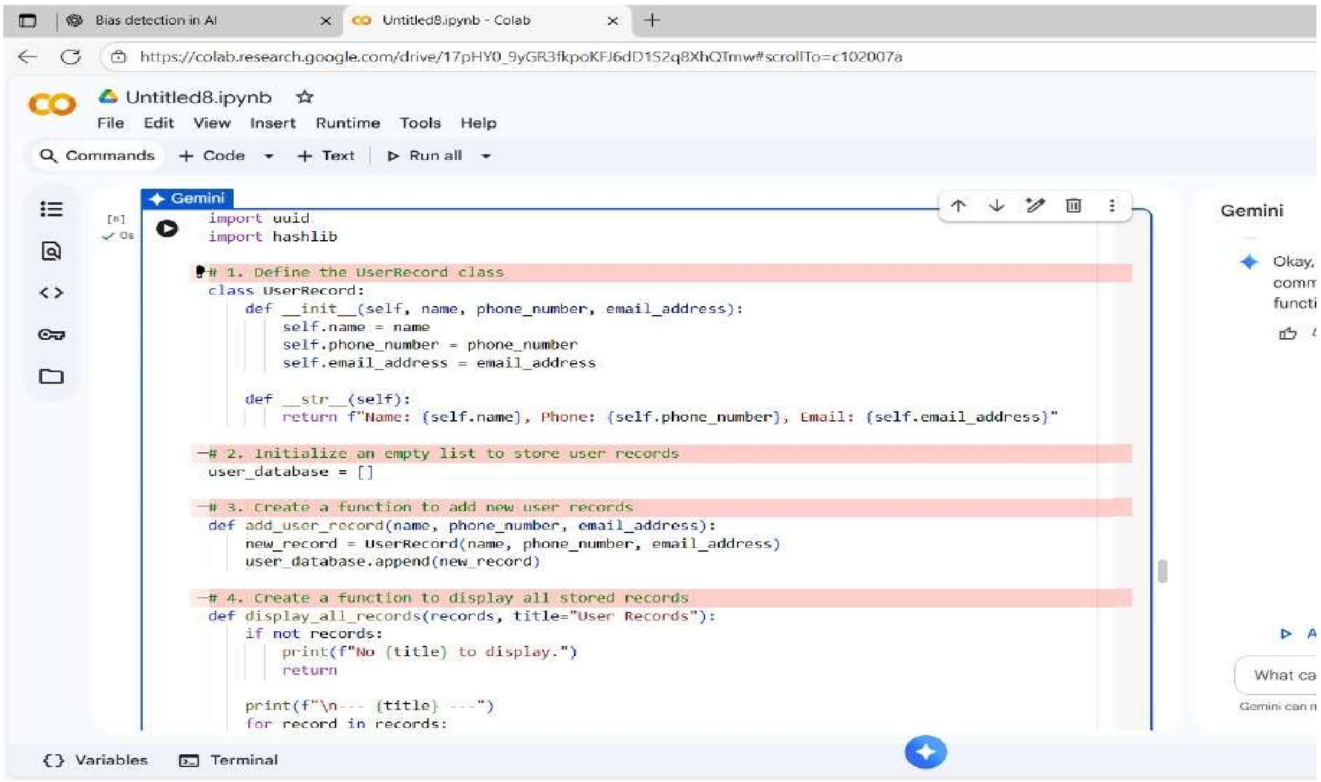
- *How should sensitive data be anonymized?*
- *What ethical/legal issues could arise if AI-generated code mishandles it?* o *What role does developer responsibility play here?*

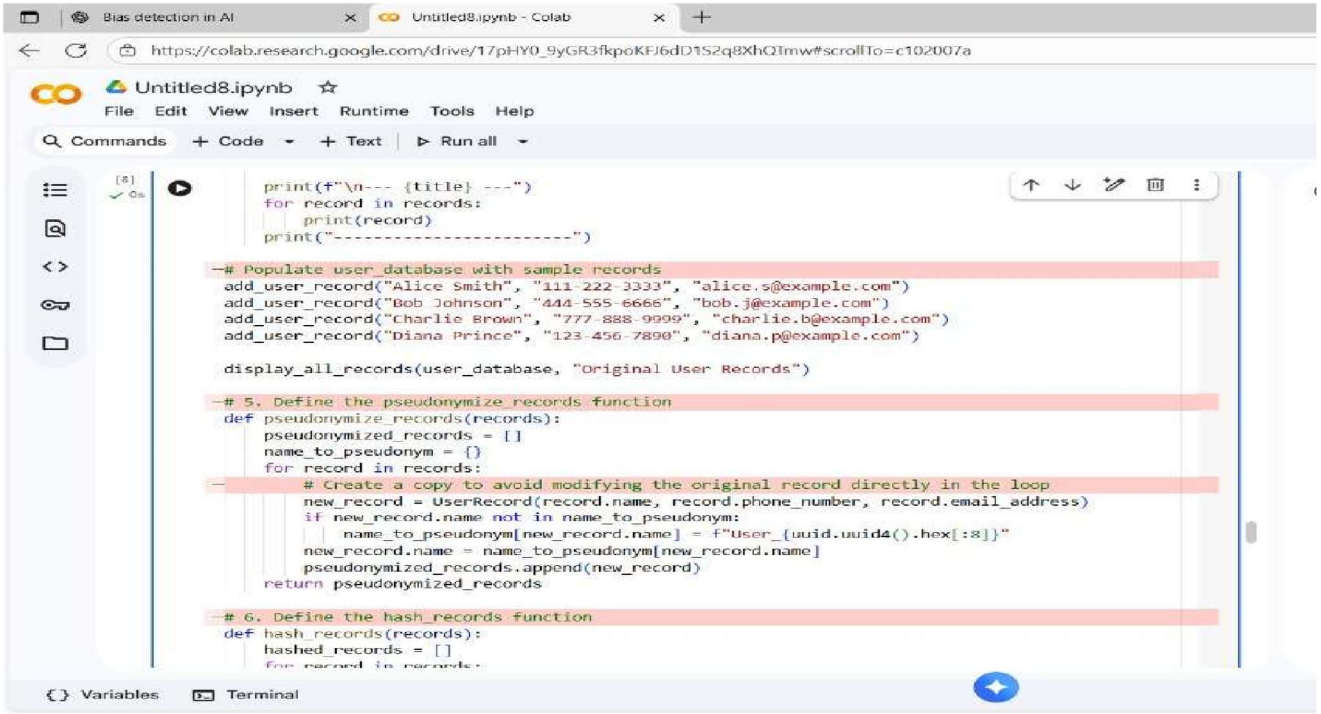
***PROMT** : Write a Python script that processes user personal data such as names, phone numbers, and email addresses. The script should read a list of user records, store them, and print them in a structured format.*

After generating the code, also explain:

- *how this sensitive data should be anonymized or masked (with examples),*
- *what ethical or legal issues could occur if the code mishandles personal data (GDPR, privacy risks, misuse),*
- *and what responsibilities developers have when building systems involving personal information."*

CODE :




Bias detection in AI
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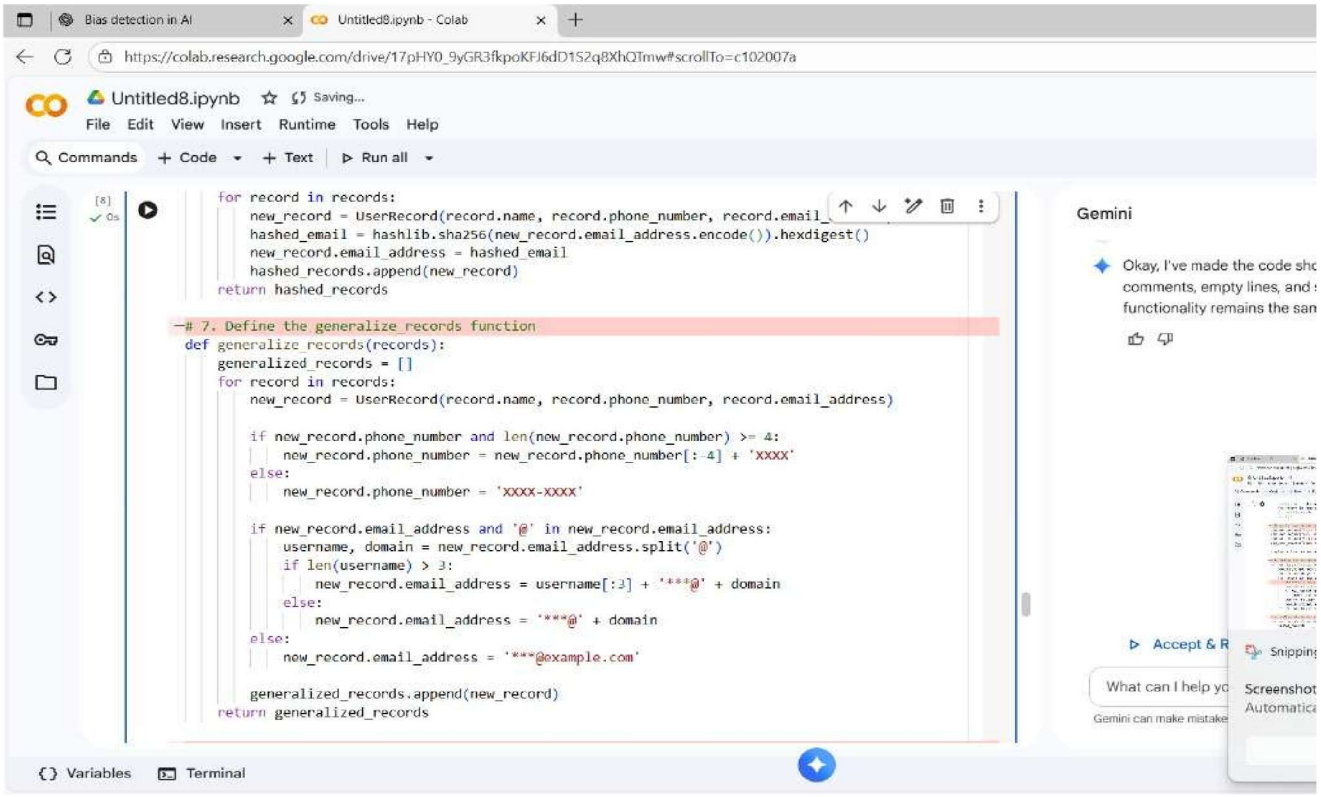
File Edit View Insert Runtime Tools Help
Commands + Code + Text Run all
print(f"\n--- {title} ---")
for record in records:
print(record)
print("--------------------------")
# Populate user_database with sample records
add_user_record("Alice Smith", "111-222-3333", "alice.s@example.com")
add_user_record("Bob Johnson", "444-555-6666", "bob.j@example.com")
add_user_record("Charlie Brown", "777-888-9999", "charlie.b@example.com")
add_user_record("Diana Prince", "123-456-7890", "diana.p@example.com")
display_all_records(user_database, "Original User Records")
# 5. Define the pseudonymize_records function
def pseudonymize_records(records):
pseudonymized_records = []
name_to_pseudonym = {}
for record in records:
# Create a copy to avoid modifying the original record directly in the loop
new_record = UserRecord(record.name, record.phone_number, record.email_address)
if new_record.name not in name_to_pseudonym:
name_to_pseudonym[new_record.name] = f"User_{uuid.uuid4().hex[:8]}"
new_record.name = name_to_pseudonym[new_record.name]
pseudonymized_records.append(new_record)
return pseudonymized_records
# 6. Define the hash_records function
def hash_records(records):
hashed_records = []
Variables
Terminal


Bias detection in AI
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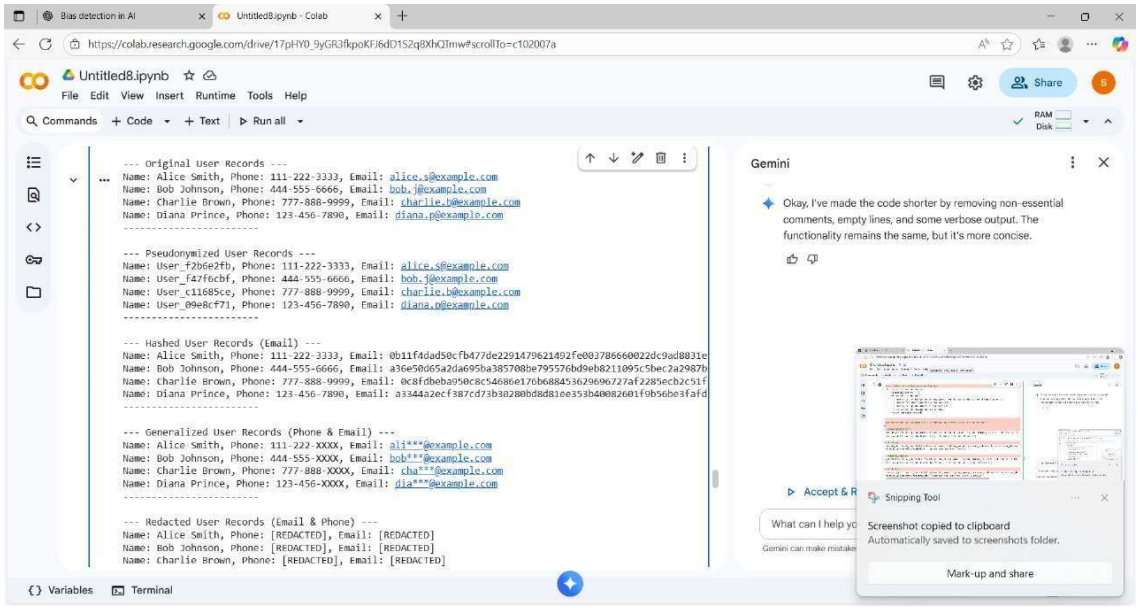
for record in records:
new_record = UserRecord(record.name, record.phone_number, record.email_address)
hashed_email = hashlib.sha256(new_record.email_address.encode()).hexdigest()
new_record.email_address = hashed_email
hashed_records.append(new_record)
return hashed_records
# 7. Define the generalize_records function
def generalize_records(records):
generalized_records = []
for record in records:
new_record = UserRecord(record.name, record.phone_number, record.email_address)
if new_record.phone_number and len(new_record.phone_number) >= 4:
new_record.phone_number = new_record.phone_number[:-4] + 'XXXX'
else:
new_record.phone_number = 'XXXX-XXXX'
if new_record.email_address and '@' in new_record.email_address:
username, domain = new_record.email_address.split('@')
if len(username) > 3:
new_record.email_address = username[:3] + '***@' + domain
else:
new_record.email_address = '***@' + domain
else:
new_record.email_address = '***@example.com'
generalized_records.append(new_record)
return generalized_records
Gemini
Okay, I've made the code sh
comments, empty lines, and
functionality remains the san
Accept & R
What can I help yo
Gemini can make mistake
Variables
Terminal



OBSERVATION *: Certainly! This script defines a UserRecord class to manage user data (name, phone, email). It then demonstrates four data anonymization techniques:*

Pseudonymization: Replaces names with unique, artificial IDs (e.g., "User_abc123").

Hashing: Transforms email addresses into irreversible hash values.

Generalization: Masks parts of phone numbers (e.g., "XXXX") and email usernames (e.g., "ali").*

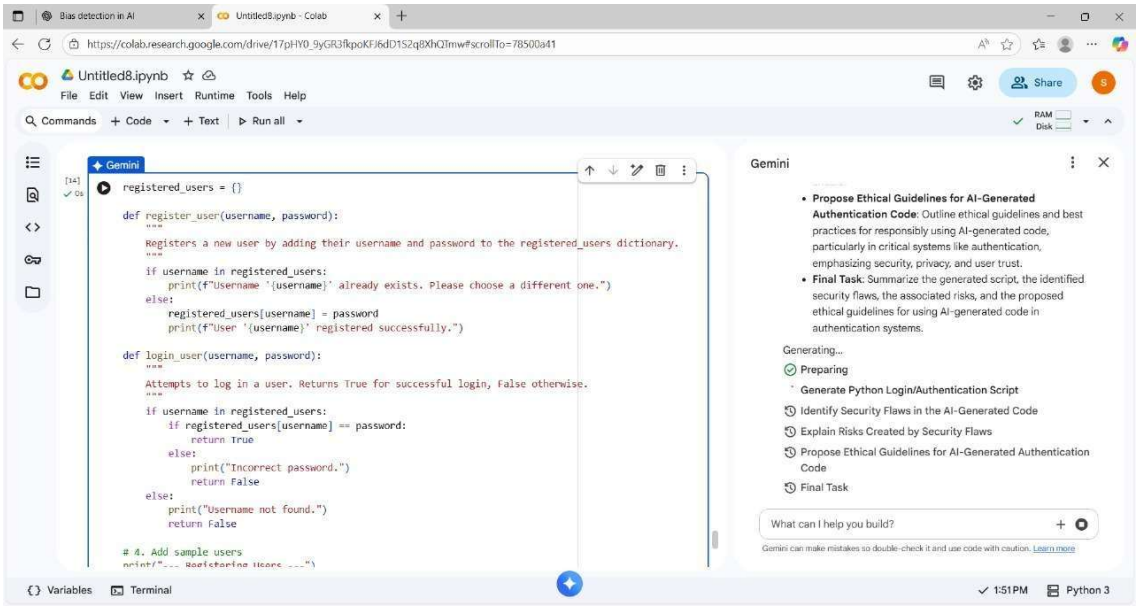
Redaction: Completely replaces sensitive fields (phone, email) with [REDACTED].

Each technique is applied to a copy of the original data, and the results are printed to show how sensitive information is protected.

Task 3 *– AI-Generated Security Risks*

- *Use AI to generate login/authentication code.*
- *Identify possible security flaws (e.g., weak password storage, lack of encryption).*
- *Students must document risks and propose ethical guidelines for safe AI code usage.*

PROMT *: "Generate a simple Python login/authentication script that handles usernames and passwords. After giving the code, identify all possible security flaws in the AI-generated code (such as plain-text passwords, lack of hashing, weak validation, no encryption, or insecure storage). Then explain the risks these flaws create and propose ethical guidelines for safely using AI-generated code in authentication systems." CODE :*


Bias detection in AI
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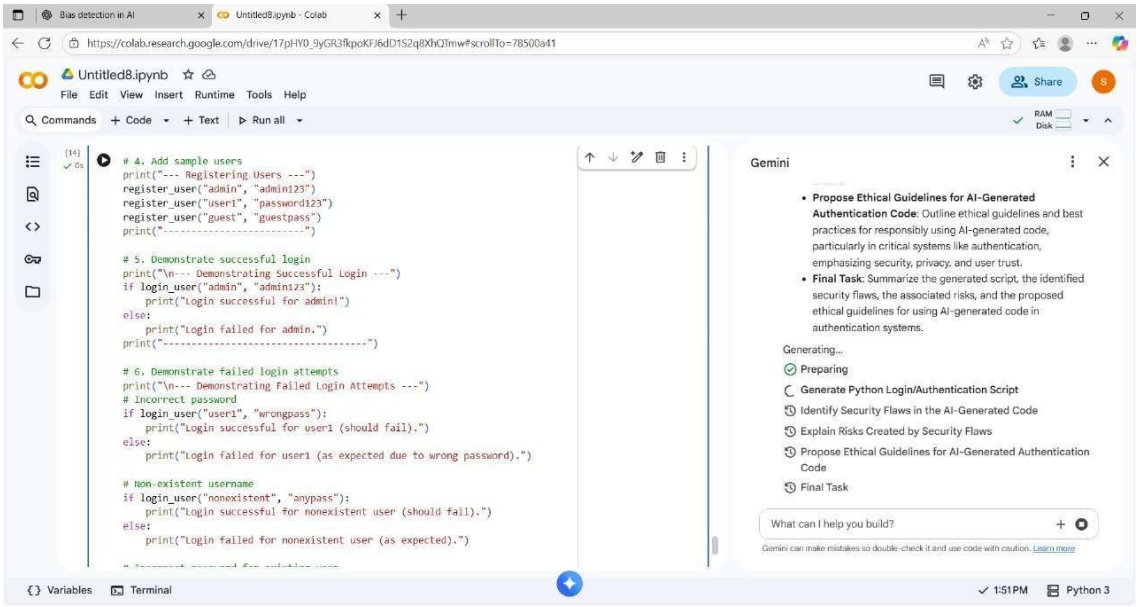
Gemini
[14] registered_users = {}
def register_user(username, password):
"""
Registers a new user by adding their username and password to the registered_users dictionary.
"""
if username in registered_users:
print(f"Username '{username}' already exists. Please choose a different one.")
else:
registered_users[username] = password
print(f"User '{username}' registered successfully.")
def login_user(username, password):
"""
Attempts to log in a user. Returns True for successful login, False otherwise.
"""
if username in registered_users:
if registered_users[username] == password:
return True
else:
print("Incorrect password.")
return False
else:
print("Username not found.")
return False
4. Add sample users
Gemini
Propose Ethical Guidelines for AI-Generated Authentication Code: Outline ethical guidelines and best practices for responsibly using AI-generated code, particularly in critical systems like authentication, emphasizing security, privacy, and user trust.
Final Task: Summarize the generated script, the identified security flaws, the associated risks, and the proposed ethical guidelines for using AI-generated code in authentication systems.
Generating...
Preparing
Generate Python Login/Authentication Script
Identify Security Flaws in the AI-Generated Code
Explain Risks Created by Security Flaws
Propose Ethical Guidelines for AI-Generated Authentication Code
Final Task
What can I help you build?
Gemini can make mistakes so double-check it and use code with caution. Learn more
Variables Terminal
1:51PM Python 3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RAM Disk
[14] # 4. Add sample users
print("--- Registering Users ---")
register_user("admin", "admin123")
register_user("user1", "password123")
register_user("guest", "guestpass")
print("-------------------------")
# 5. Demonstrate successful login
print("\n--- Demonstrating Successful Login ---")
if login_user("admin", "admin123"):
print("Login successful for admin!")
else:
print("Login failed for admin.")
print("-----------------------------------")
# 6. Demonstrate failed login attempts
print("\n--- Demonstrating Failed Login Attempts ---")
# Incorrect password
if login_user("user1", "wrongpass"):
print("Login successful for user1 (should fail).")
else:
print("Login failed for user1 (as expected due to wrong password).")
# Non-existent username
if login_user("nonexistent", "anypass"):
print("Login successful for nonexistent user (should fail).")
else:
print("Login failed for nonexistent user (as expected).")
Gemini
Propose Ethical Guidelines for AI-Generated Authentication Code: Outline ethical guidelines and best practices for responsibly using AI-generated code, particularly in critical systems like authentication, emphasizing security, privacy, and user trust.
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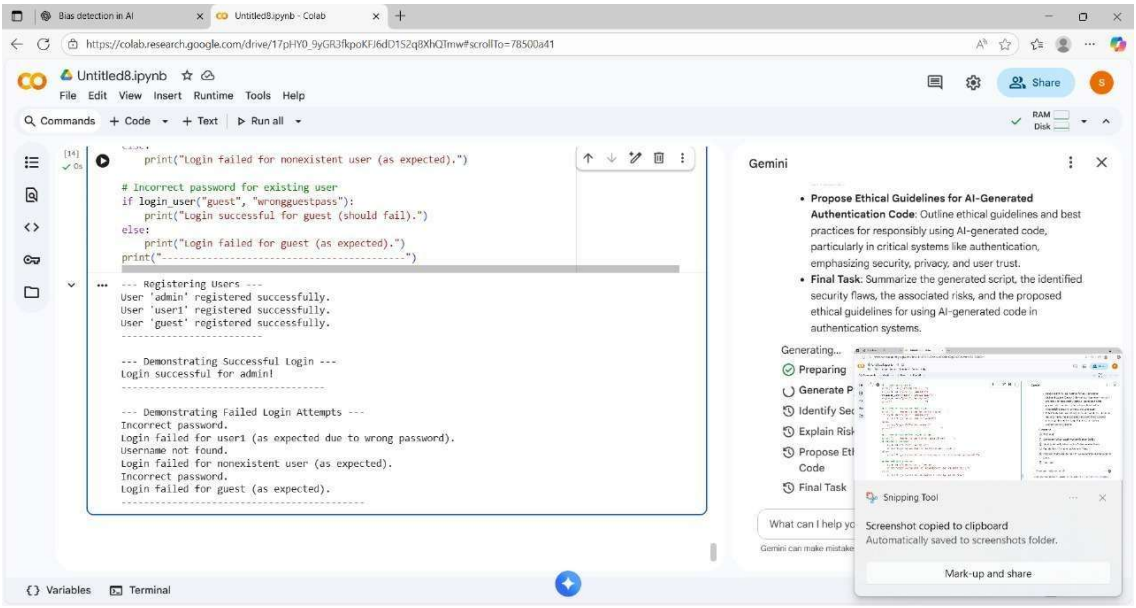


OBSERVATION : *A key observation is that while the AI-generated login script fulfills the basic functional requirement, it severely lacks fundamental security measures essential for any real-world application, primarily by storing passwords in plain text. This highlights the critical need for developers to scrutinize AI-generated code for security vulnerabilities, especially in sensitive areas like authentication.*

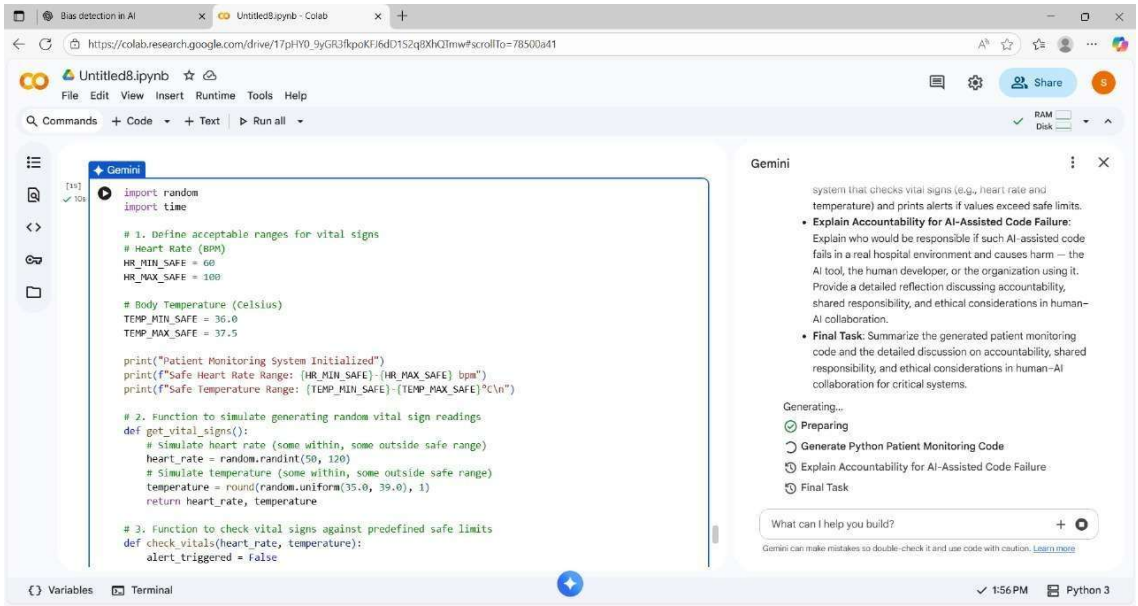
Task 4 *– Accountability in Human–AI Collaboration*

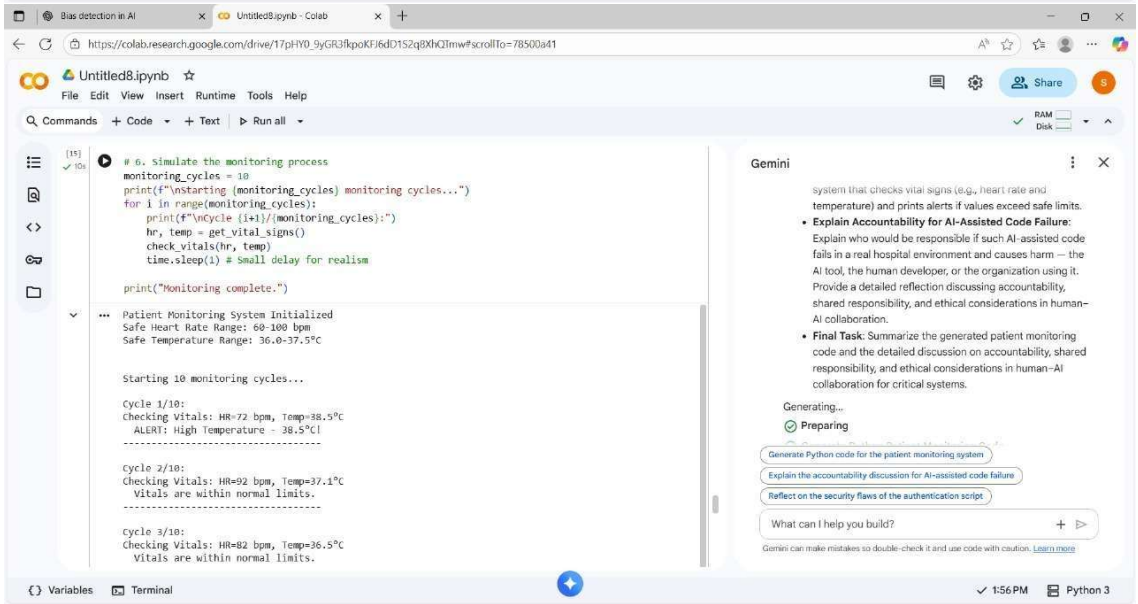
- *Scenario: AI writes code for a hospital's patient monitoring system.*
- *If the code fails and causes harm, who is responsible?*
  - *The AI tool?*
  - *The human developer?*
  - *The organization using it?*
- *Students must debate and submit a reflection report.*

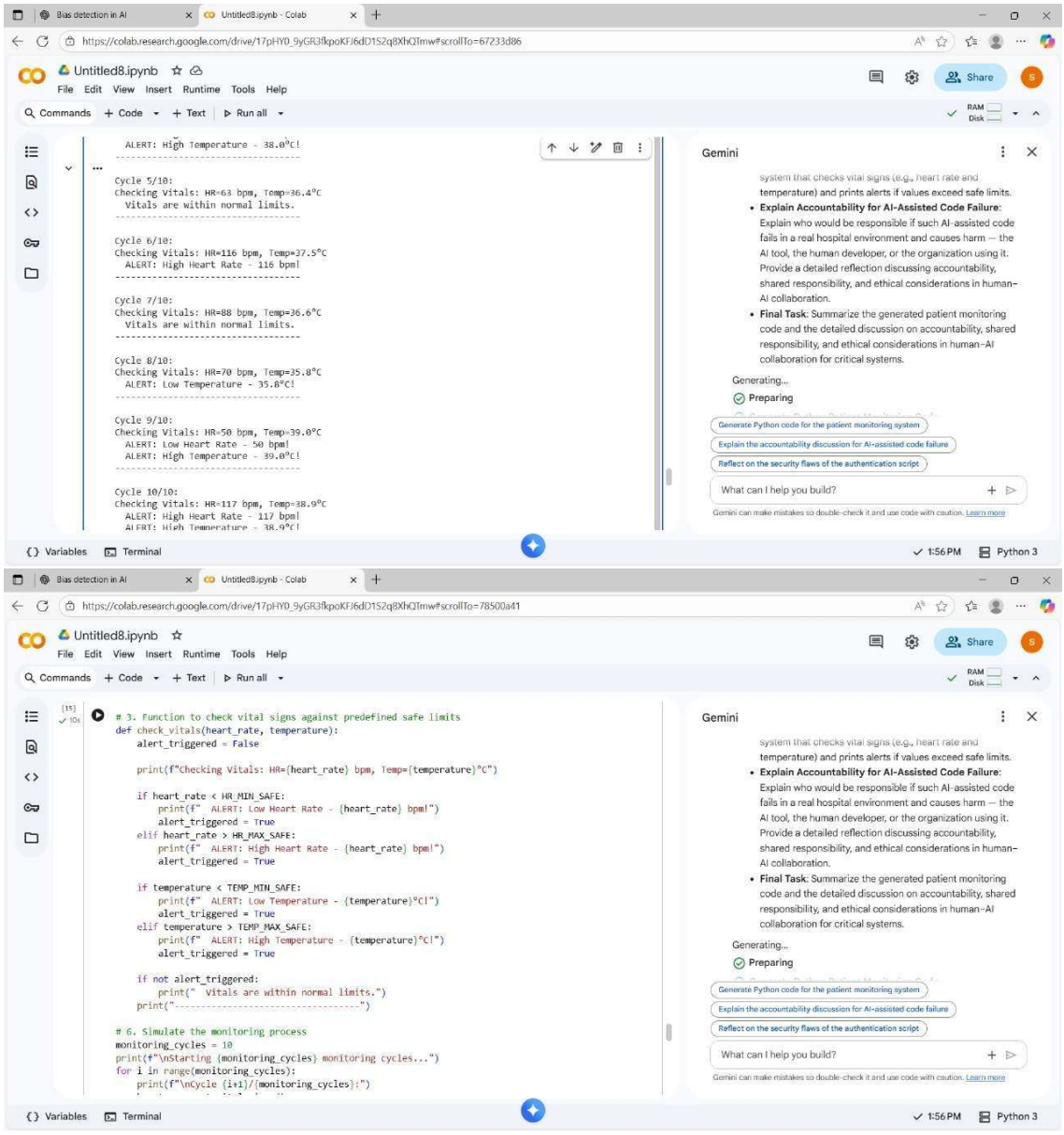
PROMT *: "Write a simple Python code snippet for a basic patient-monitoring system that checks vital signs (e.g., heart rate and temperature) and prints alerts if values exceed safe limits.*

*After generating the code, explain who would be responsible if such AI-assisted code fails in a real hospital environment and causes harm — the AI tool, the human developer, or the organization using it. Provide a detailed reflection discussing accountability, shared responsibility, and ethical considerations in human–AI collaboration.***"**

CODE :







OBSERVATION : *A key observation is that this script provides a simplified, simulated patient monitoring system. While it e ectively demonstrates basic vital sign checking and alerting logic, a real-world medical application would require significantly more robust data handling, error checking, and advanced features for patient safety.*

Task 5 *– Limitations of AI in Critical Systems*

- *Ask AI to generate code for a life-critical application (e.g., railway signaling, medical diagnosis).*
- *Discuss:*
  - *Should AI code be used directly in such systems? o What level of human oversight is mandatory?*
  - *How do we balance e iciency vs safety?*

PROMT *: Generate a simple Python script for a life-critical system, such as a basic railway-signal safety checker that monitors track status and prints warnings if a collision risk is detected.*

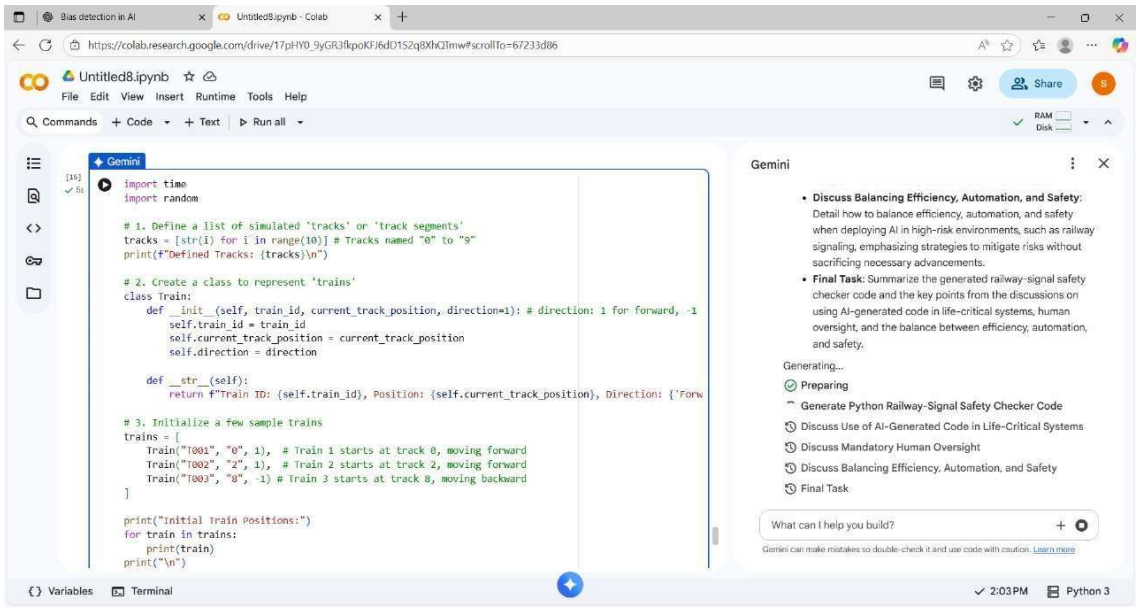
After the code, discuss:

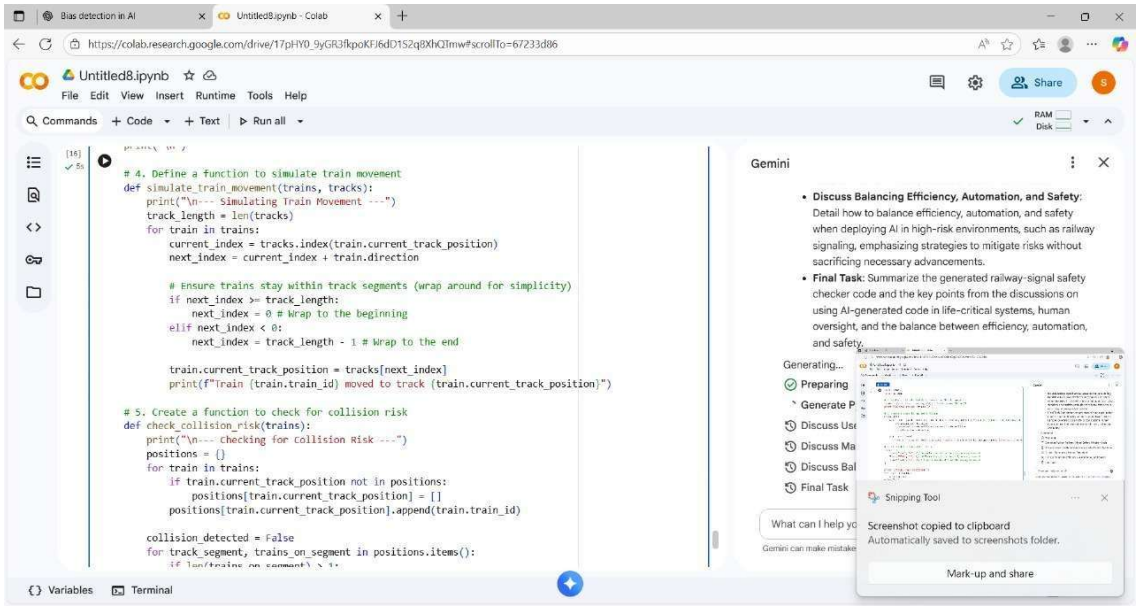
• whether AI-generated code should ever be used directly in life-critical systems,

• what level of human oversight is mandatory,

• and how to balance e iciency, automation, and safety when using AI in high-risk environments."

• ***CODE :***




Bias detection in AI
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RAM Disk
# 4. Define a function to simulate train movement
def simulate_train_movement(trains, tracks):
print("\n--- Simulating Train Movement ---")
track_length = len(tracks)
for train in trains:
current_index = tracks.index(train.current_track_position)
next_index = current_index + train.direction
# Ensure trains stay within track segments (wrap around for simplicity)
if next_index >= track_length:
next_index = 0 # Wrap to the beginning
elif next_index < 0:
next_index = track_length - 1 # Wrap to the end
train.current_track_position = tracks[next_index]
print(f"Train {train.train_id} moved to track {train.current_track_position}")
# 5. Create a function to check for collision risk
def check_collision_risk(trains):
print("\n--- Checking for Collision Risk ---")
positions = {}
for train in trains:
if train.current_track_position not in positions:
positions[train.current_track_position] = []
positions[train.current_track_position].append(train.train_id)
collision_detected = False
for track_segment, trains_on_segment in positions.items():
Gemini
Discuss Balancing Efficiency, Automation, and Safety: Detail how to balance efficiency, automation, and safety when deploying AI in high-risk environments, such as railway signaling, emphasizing strategies to mitigate risks without sacrificing necessary advancements.
Final Task: Summarize the generated railway-signal safety checker code and the key points from the discussions on using AI-generated code in life-critical systems, human oversight, and the balance between efficiency, automation, and safety.
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Final Task
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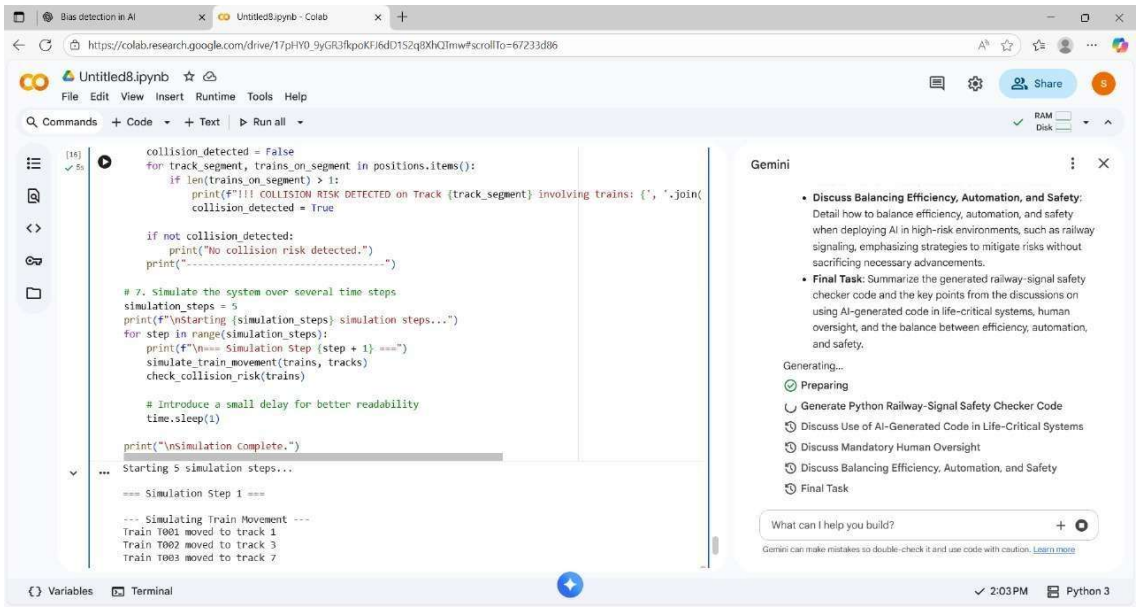
Terminal


Bias detection in AI
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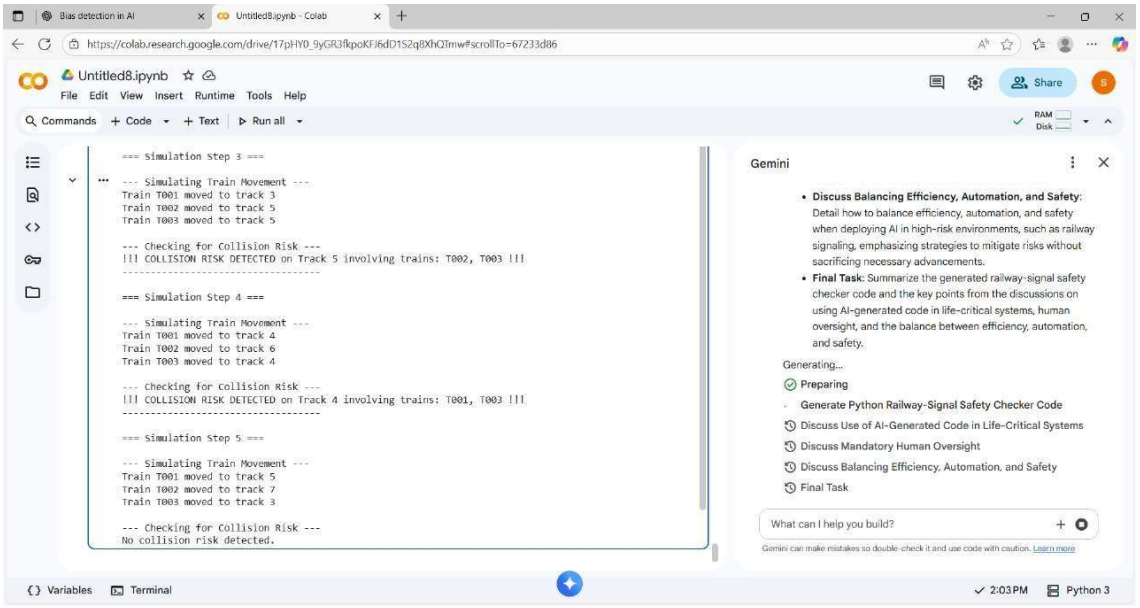
collision_detected = False
for track_segment, trains_on_segment in positions.items():
if len(trains_on_segment) > 1:
print(f"!!! COLLISION RISK DETECTED on Track {track_segment} involving trains: {', '.join(
collision_detected = True
if not collision_detected:
print("No collision risk detected.")
print("----------------------------------")
# 7. Simulate the system over several time steps
simulation_steps = 5
print(f"\nStarting {simulation_steps} simulation steps...")
for step in range(simulation_steps):
print(f"\n=== Simulation Step {step + 1} ===")
simulate_train_movement(trains, tracks)
check_collision_risk(trains)
# Introduce a small delay for better readability
time.sleep(1)
print("\nSimulation Complete.")
Starting 5 simulation steps...
=== Simulation Step 1 ===
--- Simulating Train Movement ---
Train T001 moved to track 1
Train T002 moved to track 3
Train T003 moved to track 7
Gemini
Discuss Balancing Efficiency, Automation, and Safety: Detail how to balance efficiency, automation, and safety when deploying AI in high-risk environments, such as railway signaling, emphasizing strategies to mitigate risks without sacrificing necessary advancements.
Final Task: Summarize the generated railway-signal safety checker code and the key points from the discussions on using AI-generated code in life-critical systems, human oversight, and the balance between efficiency, automation, and safety.
Generating...
Preparing
Generate Python Railway-Signal Safety Checker Code
Discuss Use of AI-Generated Code in Life-Critical Systems
Discuss Mandatory Human Oversight
Discuss Balancing Efficiency, Automation, and Safety
Final Task
What can I help you build?
Gemini can make mistakes so double-check it and use code with caution. Learn more
Variables
Terminal
2:03PM
Python 3



OBSERVATION :

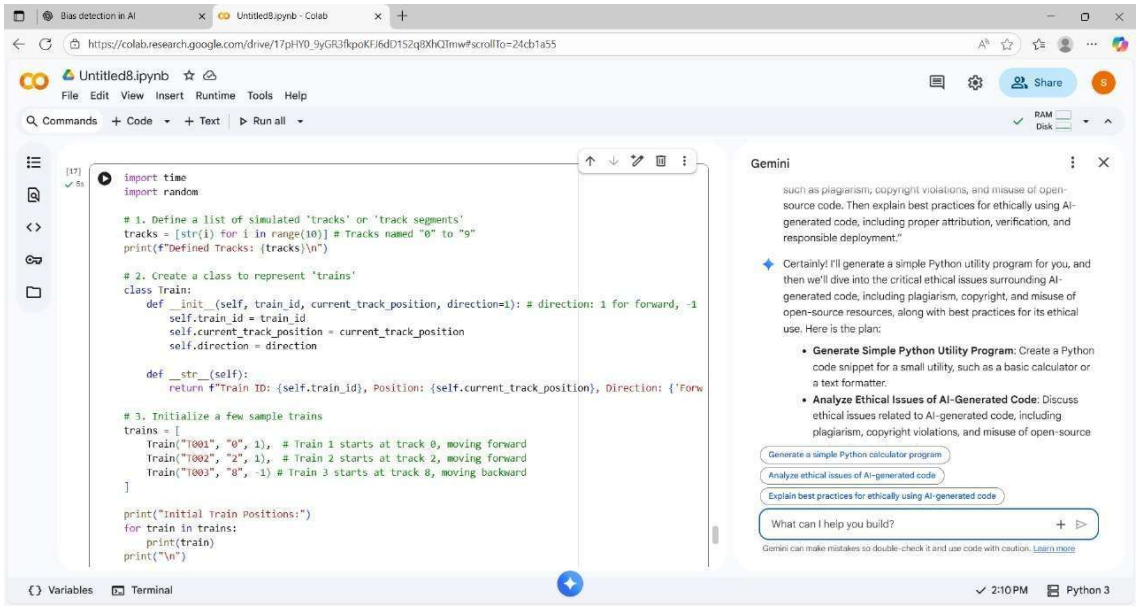
This script is a simplified simulation of a railway safety system. It e ectively demonstrates the core idea of tracking multiple trains and detecting potential collision risks by checking if more than one train occupies the same track segment. While basic, it clearly illustrates the principle of collision detection.

Task 6 – Ethical Use of AI-Generated Code

- *Students analyze real-world cases (e.g., plagiarism, copyright violation, misuse of open-source code).*
- *Identify best practices for ethically using AI code:*
  - *Attribution o*
  - *Verification o*
  - *Responsible deployment*

PROMT : *"Write a simple Python program (any small utility, such as a text formatter or calculator). After giving the code, analyze ethical issues related to AI-generated code using real-world concerns such as plagiarism, copyright violations, and misuse of opensource code. Then explain best practices for ethically using AI-generated code, including proper attribution, verification, and responsible deployment."*

CODE :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[17]
import time
import random
# 1. Define a list of simulated 'tracks' or 'track segments'
tracks = [str(i) for i in range(10)] # Tracks named "0" to "9"
print(f"Defined Tracks: {tracks}\n")
# 2. Create a class to represent 'trains'
class Train:
def __init__(self, train_id, current_track_position, direction=1): # direction: 1 for forward, -1
self.train_id = train_id
self.current_track_position = current_track_position
self.direction = direction
def __str__(self):
return f"Train ID: {self.train_id}, Position: {self.current_track_position}, Direction: {'Forw
# 3. Initialize a few sample trains
trains = [
Train("1001", "0", 1), # Train 1 starts at track 0, moving forward
Train("1002", "2", 1), # Train 2 starts at track 2, moving forward
Train("1003", "8", -1) # Train 3 starts at track 8, moving backward
]
print("Initial Train Positions:")
for train in trains:
print(train)
print("\n")
Gemini
such as plagiarism, copyright violations, and misuse of open-source code. Then explain best practices for ethically using AI-generated code, including proper attribution, verification, and responsible deployment."
Certainly! I'll generate a simple Python utility program for you, and then we'll dive into the critical ethical issues surrounding AI-generated code, including plagiarism, copyright, and misuse of open-source resources, along with best practices for its ethical use. Here is the plan:
Generate Simple Python Utility Program: Create a Python code snippet for a small utility, such as a basic calculator or a text formatter.
Analyze Ethical Issues of AI-Generated Code: Discuss ethical issues related to AI-generated code, including plagiarism, copyright violations, and misuse of open-source
Generate a simple Python calculator program
Analyze ethical issues of AI-generated code
Explain best practices for ethically using AI-generated code
What can I help you build?
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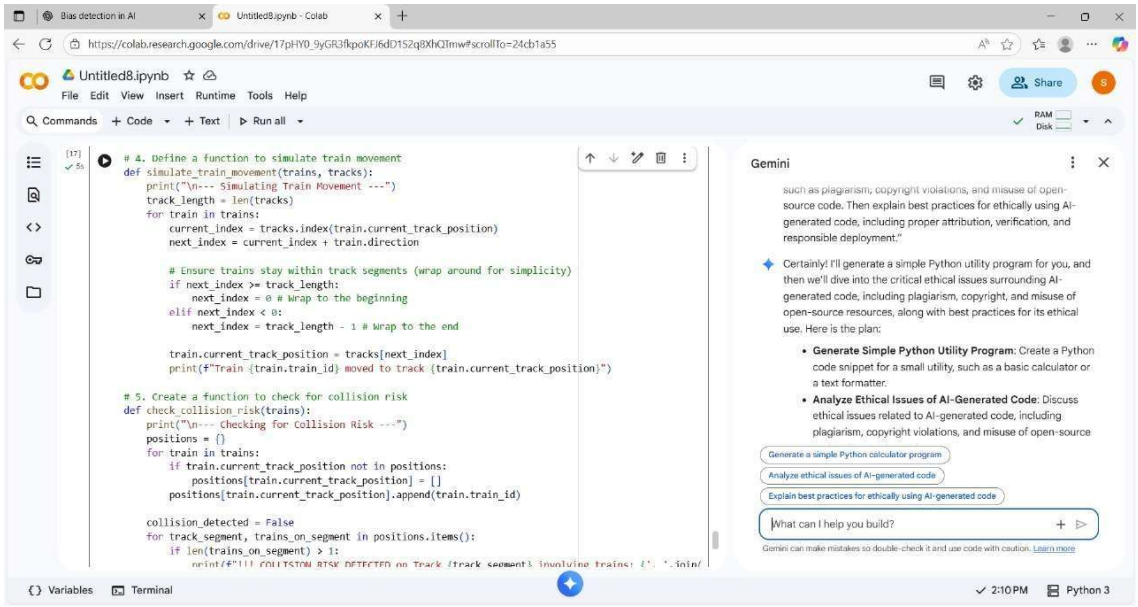
Variables Terminal
2:10 PM Python 3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next_index = current_index + train.direction
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if next_index >= track_length:
next_index = 0 # Wrap to the beginning
elif next_index < 0:
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train.current_track_position = tracks[next_index]
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for train in trains:
if train.current_track_position not in positions:
positions[train.current_track_position] = []
positions[train.current_track_position].append(train.train_id)
collision_detected = False
for track_segment, trains_on_segment in positions.items():
if len(trains_on_segment) > 1:
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such as plagiarism, copyright violations, and misuse of open-source code. Then explain best practices for ethically using AI-generated code, including proper attribution, verification, and responsible deployment."
Certainly! I'll generate a simple Python utility program for you, and then we'll dive into the critical ethical issues surrounding AI-generated code, including plagiarism, copyright, and misuse of open-source resources, along with best practices for its ethical use. Here is the plan:
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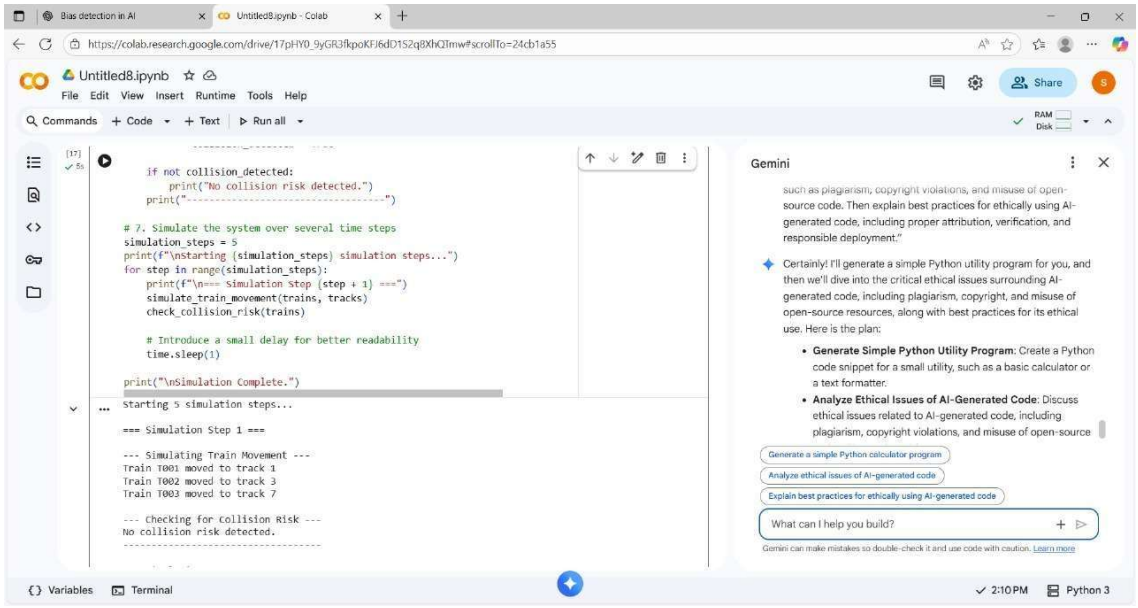
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RAM Disk
if not collision_detected:
print("No collision risk detected.")
print("----------")
# 7. Simulate the system over several time steps
simulation_steps = 5
print(f"\nStarting {simulation_steps} simulation steps...")
for step in range(simulation_steps):
print(f"\n=== Simulation Step {step + 1} ===")
simulate_train_movement(trains, tracks)
check_collision_risk(trains)
# Introduce a small delay for better readability
time.sleep(1)
print("\nSimulation Complete.")
Starting 5 simulation steps...
=== Simulation Step 1 ===
--- Simulating Train Movement ---
Train T001 moved to track 1
Train T002 moved to track 3
Train T003 moved to track 7
--- Checking for Collision Risk ---
No collision risk detected.
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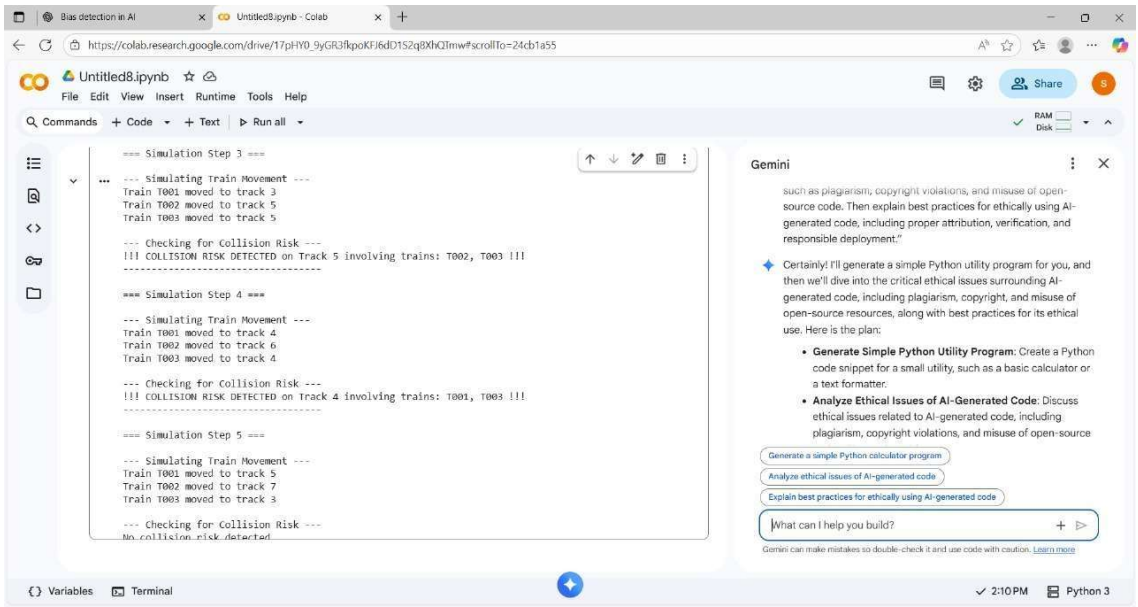
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=== Simulation Step 3 ===
--- Simulating Train Movement ---
Train T001 moved to track 3
Train T002 moved to track 5
Train T003 moved to track 5
--- Checking for Collision Risk ---
!!! COLLISION RISK DETECTED on Track 5 involving trains: T002, T003 !!!
=== Simulation Step 4 ===
--- Simulating Train Movement ---
Train T001 moved to track 4
Train T002 moved to track 6
Train T003 moved to track 4
--- Checking for Collision Risk ---
!!! COLLISION RISK DETECTED on Track 4 involving trains: T001, T003 !!!
=== Simulation Step 5 ===
--- Simulating Train Movement ---
Train T001 moved to track 5
Train T002 moved to track 7
Train T003 moved to track 3
--- Checking for Collision Risk ---
No collision risk detected
Gemini
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OBSERVATION : *A key observation is that this script delivers a functional basic calculator with an interactive menu and includes essential error handling for invalid input and division by zero, making it user-friendly for simple arithmetic operations.*