School of Computer Science and Artificial Intelligence

Lab Assignment # 5.5

Program : B. Tech (CSE)

Specialization : AIML

Course Title : AI Assisted
Coding Course Code: 23CS002PC304

Semester : VI

Academic Session : 2025-2026

Name of Student : R . Anirudh

Enrollment No. : 2303A52103

Batch No. : 33

Date : 23/01/26

Lab 5: Ethical Foundations – Responsible AI Coding Practices

Lab Objectives:

• To explore the ethical risks associated with AI-generated
Week3 -
code.

• To recognize issues related to security, bias, transparency, and copyright.

• To reflect on the responsibilities of developers when using AI tools in software development.

• To promote awareness of best practices for responsible and ethical AI coding.

Lab Outcomes (LOs):

After completing this lab, students will be able to:

• Identify and avoid insecure coding patterns generated by AI tools.

• Detect and analyze potential bias or discriminatory logic in AI-generated outputs.

• Evaluate originality and licensing concerns in reused AI-generated code.

• Understand the importance of explainability and transparency in AI-assisted programming.

• Reflect on accountability and the human role in ethical AI coding.

Task Description – 1: (Transparency in Algorithm Optimization)

Problem: Use AI to generate two solutions for checking prime numbers.

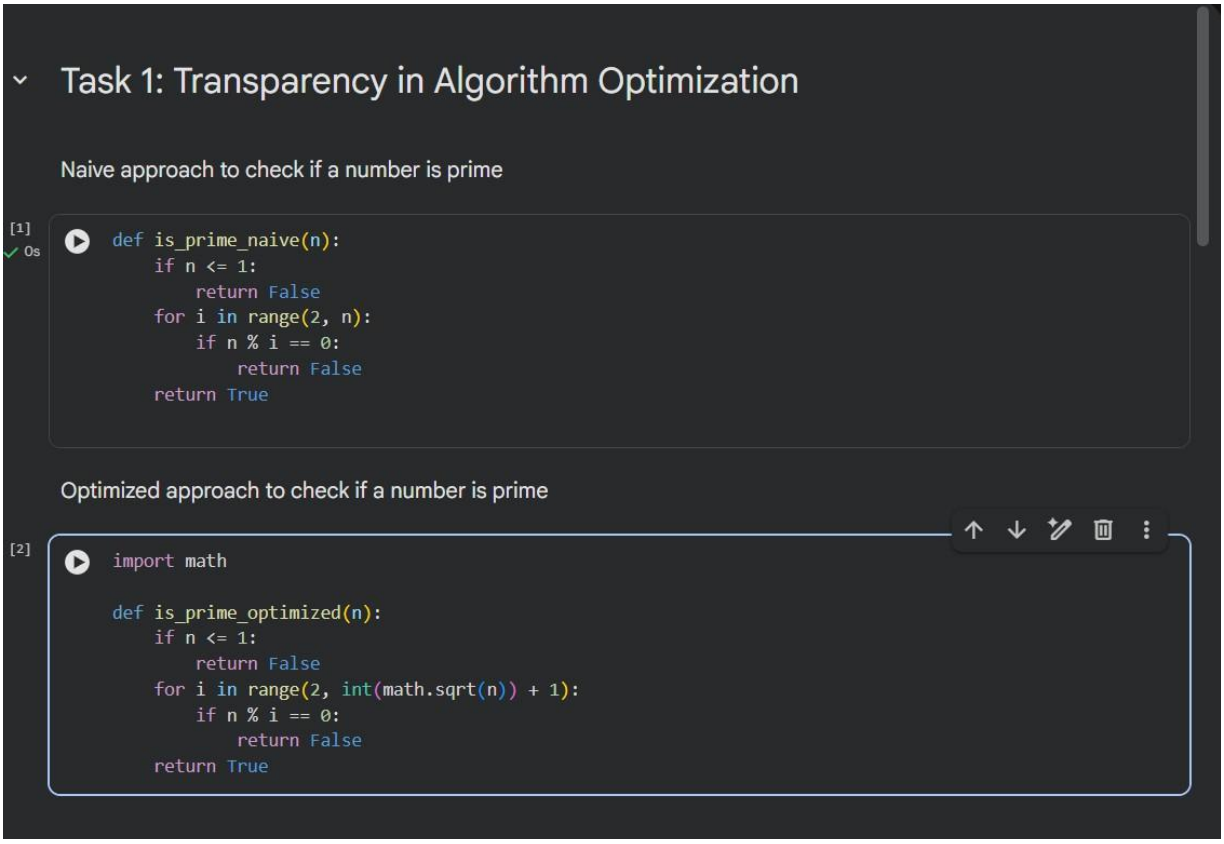
1. Naive approach
2. Optimized approach

Prompt Used (Zero-shot)

Generate Python code for two prime-checking methods and

explain how the optimized version improves performance.

Python Code:



Task 1: Transparency in Algorithm Optimization

Naive approach to check if a number is prime

```
def is_prime_naive(n):
    if n <= 1:
        return False
    for i in range(2, n):
        if n % i == 0:
            return False
    return True
```

Optimized approach to check if a number is prime

```
import math

def is_prime_optimized(n):
    if n <= 1:
        return False
    for i in range(2, int(math.sqrt(n)) + 1):
        if n % i == 0:
            return False
    return True
```

Explanation & Time Complexity

- **Naive Method**
    - Checks divisibility from 2 to n-1
    - Time Complexity: $O(n)$
    - Inefficient for large numbers
- **Optimized Method**
    - Checks divisibility only up to $\sqrt{n}$
    - Time Complexity: $O(\sqrt{n})$
    - Faster because factors repeat after square roo

Task – 2: Transparency in Recursive Algorithms Objective

Problem: Generate a recursive Fibonacci function with clear explanations.

Prompt Used (One-shot)

1. Ask AI to add clear comments explaining recursion.
2. Ask AI to explain base cases and recursive calls

Python Code:

Task 2: Transparency in Recursive Algorithms

recursive Fibonacci function

[3]
0s

```python
def fibonacci(n):
    # Base case: Fibonacci of 0 is 0
    if n == 0:
        return 0

    # Base case: Fibonacci of 1 is 1
    if n == 1:
        return 1

    # Recursive case:
    # Fibonacci of n is the sum of Fibonacci of (n-1) and (n-2)
    return fibonacci(n - 1) + fibonacci(n - 2)
```

Explanation

- **Base Cases**
  - fibonacci(0) returns 0
  - fibonacci(1) returns 1
- **Recursive Call**
  - Function keeps calling itself with smaller values
  - Stops when base cases are reached
- **Execution Match**
  - Each recursive call mirrors the explanation exactly
  - Ensures transparency and correctness

Task Description – 3: Transparency in Error Handling.

Problem: Use AI to generate a Python program that reads a file and processes data.

Prompt Used (Few-shot)

“Generate code with proper error handling and clear explanations for each exception.”

Python Code:

Task 3: Transparency in Error Handling

Python program that reads a file with proper error handling.

```python
def read_file(filename):
    try:
        file = open(filename, "r")
        data = file.read()
        file.close()
        return data

    except FileNotFoundError:
        print("Error: File not found.")

    except PermissionError:
        print("Error: Permission denied.")

    except Exception as e:
        print("Unexpected error:", e)
```

Explanation of Exceptions:

- **FileNotFoundError**
    - Occurs when the file does not exist
- **PermissionError**
    - Occurs when access rights are insufficient
- **Generic Exception**
    - Catches unexpected runtime errors

Each explanation directly corresponds to actual Python runtime behavior, ensuring transparency.

Task Description – 4: Security in User Authentication

Problem: Use AI to generate a Python program that reads a file and processes data.

Prompt :

Check whether the AI uses secure password handling practices.

Initial AI-Generated Issue (Security Flaws)

- Passwords stored in **plain text**
- No hashing
- Weak input validation

Security Risks

- Data breaches
- Password reuse attacks
- Unauthorized access

Task 4: Security in User Authentication

Secure Revised Version

```python
import hashlib

def hash_password(password):
    return hashlib.sha256(password.encode()).hexdigest()

def login(stored_hash, entered_password):
    return stored_hash == hash_password(entered_password)
```

Best Practices for Secure Authentication

- Always hash passwords (never store plain text)
- Use strong hashing algorithms (bcrypt, SHA-256, etc.)
- Validate user inputs
- Implement rate limiting and authentication checks

Task Description – 5: Privacy in Data Logging

Problem: Determine the minimum of three numbers without using min().

Prompt Used : Examine whether sensitive data is logged unnecessarily or insecurely.

Original AI Logging Risks

- Logs **username, IP address, timestamp**
- IP addresses are sensitive personal data
- Logs stored without masking or protection

Python Code:

Task 5: Privacy in Data Logging

```
import datetime

def log_activity(username):
    masked_user = username[0] + "***"
    timestamp = datetime.datetime.now()
    print(f"User: {masked_user}, Time: {timestamp}")
```

Privacy-Aware Logging Principles

- Log only necessary information
- Mask or anonymize personal data
- Avoid storing IP addresses unless required
- Protect log files from unauthorized access

Conclusion

This lab highlights that **AI-generated code is not automatically ethical or secure**.
Developers are responsible for:

- Reviewing AI outputs
- Ensuring transparency and correctness
- Preventing security and privacy violations
- Maintaining accountability for deployed code

Ethical AI coding requires **human judgment**, not blind trust in AI tools.