

AI Assisted Coding LAB ASSIGNMENT-5.4

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Batch:13

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Task Description #1:

- Prompt GitHub Copilot to generate a Python script that collects user data (e.g., name, age, email). Then, ask Copilot to add comments on how to anonymize or protect this data.

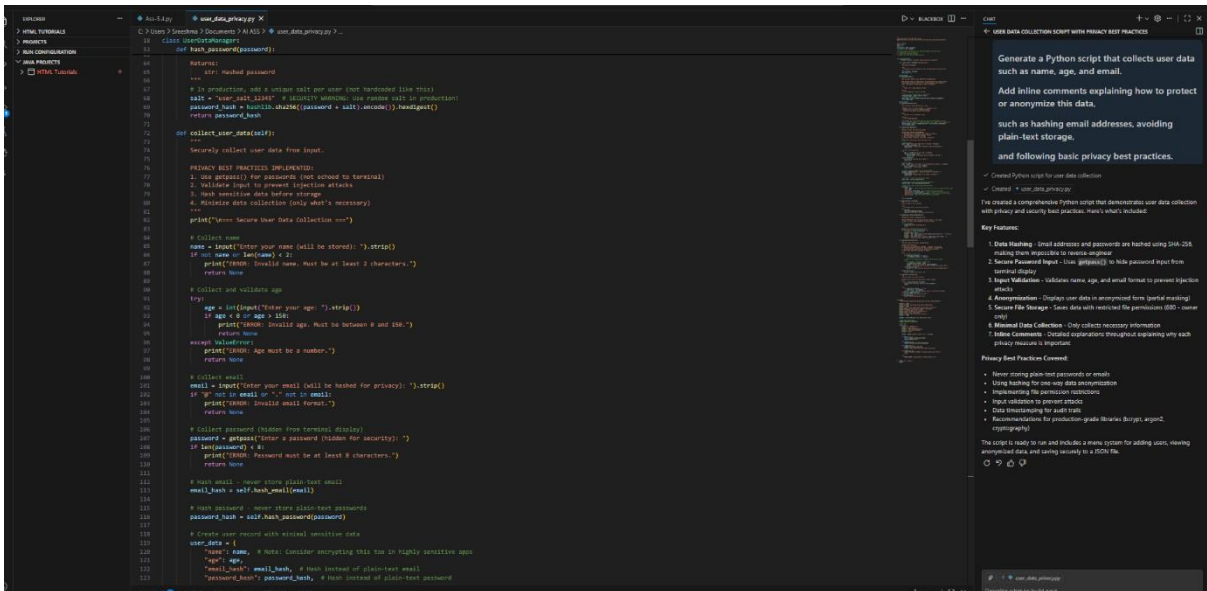
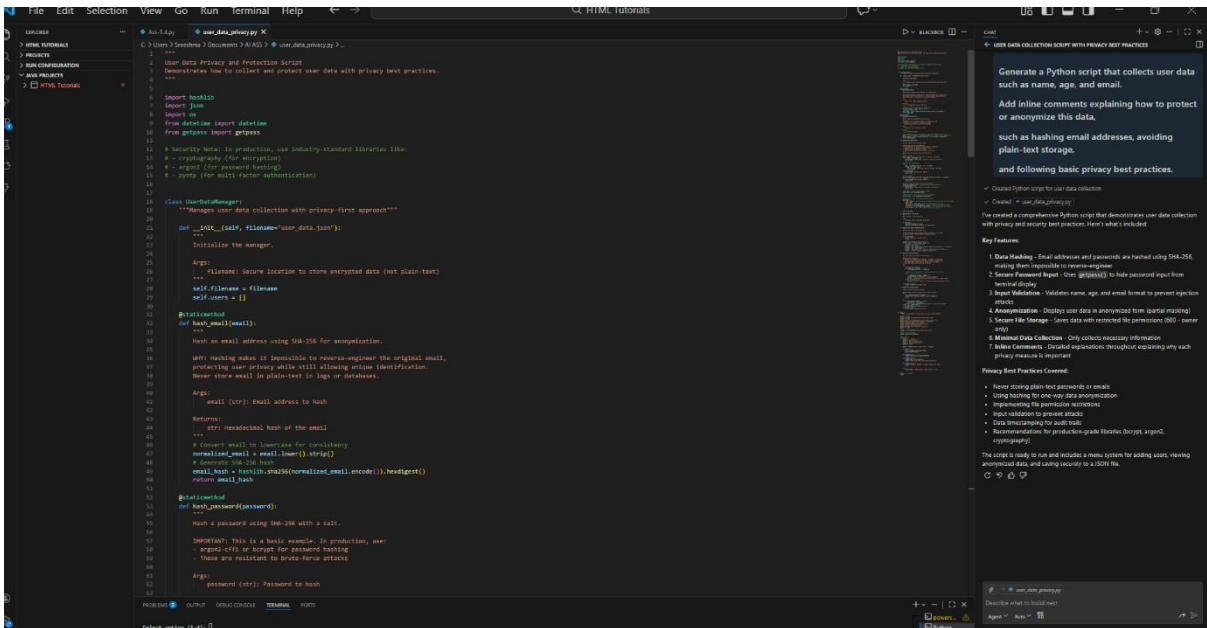
PROMPT

Generate a Python script that collects user data such as name, age, and email.

Add inline comments explaining how to protect or anonymize this data,

such as hashing email addresses, avoiding plain-text storage,

and following basic privacy best practices.

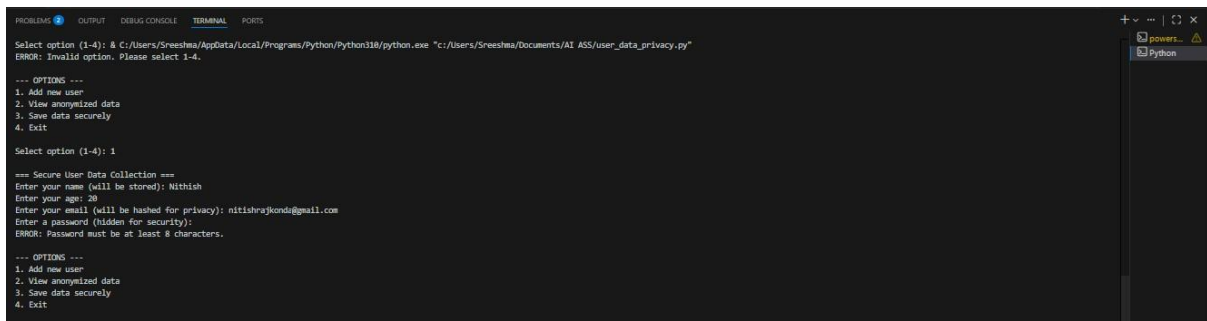


```
1 # user_data_privacy.py
2 """
3 Generate a Python script that collects user data
4 such as name, age, and email.
5
6 Add inline comments explaining how to protect
7 or anonymize this data,
8 such as hashing email addresses, avoiding
9 plain-text storage,
10 and following basic privacy best practices.
11 """
12
13 # Create a Python script for user data collection
14 # Create a user_data_privacy.py
15
16 # I've created a comprehensive Python script that demonstrates user data collection
17 # with privacy and security best practices. Here's what's included:
18
19 Key Features:
20
21 1. Data Hashing - Email addresses and passwords are hashed using SHA-256,
22 making them irreversible to reverse engineer.
23 2. Secure Password Input - Uses getpass() to hide password input from
24 terminal display.
25 3. Input Validation - Validates name, age, and email format to prevent injection
26 attacks.
27 4. Anonymization - Displays user data in anonymized form (partial masking).
28 5. Secure File Storage - Saves user data with restricted file permissions (0600 - owner
29 only).
30 6. Minimal Data Collection - Only collects necessary information.
31 7. Future Consistency - Detailed explanations throughout explaining why each
32 privacy measure is important.
33
34 Privacy Best Practices Covered:
35
36 • Never storing plain-text passwords or emails
37 • Using hashing for one-way data anonymization
38 • Implementing the permission restrictions
39 • Input validation to prevent attacks
40 • Data anonymizing for audit trails
41 • Recommendations for production-grade libraries (bcrypt, argon2,
42 cryptography)
43
44 The script is ready to run and includes a menu system for adding users, viewing
45 anonymized data, and saving securely to a JSON file.
```

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45 anonymized data, and saving securely to a JSON file.
```

Expected Output #1:

- A script with inline Copilot-suggested code and comments explaining how to safeguard or anonymize user information (e.g., hashing emails, not storing data unencrypted).



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Select option (1-4): & C:/Users/Sreeshma/AppData/Local/Programs/Python/Python310/python.exe "c:/Users/Sreeshma/Documents/AI ASS/user_data_privacy.py"
ERROR: Invalid option. Please select 1-4.

--- OPTIONS ---
1. Add new user
2. View anonymized data
3. Save data securely
4. Exit

Select option (1-4): 1

=== Secure User Data Collection ===
Enter your name (will be stored): Nithish
Enter your age: 20
Enter your email (will be hashed for privacy): nithishrajkond@gmail.com
Enter a password (hidden for security):
ERROR: Password must be at least 8 characters.

--- OPTIONS ---
1. Add new user
2. View anonymized data
3. Save data securely
4. Exit
```

Task Description #2:

- Ask Copilot to generate a Python function for sentiment analysis.

Then prompt Copilot to identify and handle potential biases in the data.

PROMPT: # Generate a Python function for sentiment analysis.

Add comments or code to identify and reduce potential biases in the data,

such as removing offensive terms, balancing positive and negative samples,

and avoiding biased language in predictions.

Task Description #3:

- Use Copilot to write a Python program that recommends products based on user history. Ask it to follow ethical guidelines

like transparency and fairness

PROMPT: # Generate a Python program that recommends products based on user purchase history.

Follow ethical AI guidelines such as transparency, fairness, and user control.

Add comments explaining how recommendations are generated,

avoid favoritism toward only popular products,

and allow users to give feedback or opt out of recommendations.

```
class RecommendationSystem:
    """Product recommendation with fairness and user control"""

    def __init__(self):
        self.user_purchases = {} # {user_id: [products]}
        self.products = {} # {product_id: [category]}
        self.user_opt_out = {} # {user_id: bool}
        self.feedback = {} # {user_id: float}

    def add_purchase(self, user_id, product_id, category):
        """Record a user purchase"""
        if user_id not in self.user_purchases:
            self.user_purchases[user_id] = []
        self.user_purchases[user_id].append(product_id)
        self.products[product_id] = {'category': category, 'count': 1}

    def recommend(self, user_id, num=5):
        """
        TRANSPARENCY: show why each recommendation is made
        FAIRNESS: don't only recommend popular products
        USER CONTROL: respect opt-out preferences
        """
        # ETHICAL CHECK: Respect user opt-out
        if user_id in self.user_opt_out:
            return {'status': 'user opted out', 'recommendations': []}

        if user_id not in self.user_purchases:
            return {'status': 'New user', 'recommendations': []}

        user_history = self.user_purchases[user_id]
        user_categories = [self.products[p].get('category') for p in user_history if p in self.products]

        # Find candidates
        candidates = []
        for prod_id, prod_data in self.products.items():
            if prod_id not in user_history: # skip already purchased
                category = prod_data.get('category')

                # FAIRNESS: Score based on relevance + diversity
                if category in user_categories:
                    score = 0.5 # Bias toward user's interests
                else:
                    score = 0.5 # Explore new category

                # TRANSPARENCY: Explain why
                reason = f"Similar to your {category} purchases" if category in user_categories else f"Try new: {category}"

                candidates.append({
                    'product': prod_id,
                    'score': score,
                    'reason': reason
                })

        # Sort by score and return top N
        top_recs = sorted(candidates, key=lambda x: x['score'], reverse=True)[:num]

        return {
            'status': 'Success',
            'user_id': user_id,
            'history': user_history,
            'recommendations': top_recs
        }
```


Ensure logs do NOT store sensitive information such as passwords,

emails, or personal identifiers.

Add comments explaining ethical logging practices and privacy protection.

```
1 #!/usr/bin/env python3
2 """Simple ethical logging for web applications"""
3
4 import logging
5 import re
6
7 class PrivacyFilter(logging.Filter):
8     """Remove sensitive data from logs"""
9
10     def filter(self, record):
11         """Mask passwords, emails, tokens, cards before logging"""
12         msg = record.msg
13
14         # PRIVACY: Mask passwords
15         msg = re.sub('password*', 'password***REDACTED***', msg, flags=re.IGNORECASE)
16
17         # PRIVACY: Mask emails (show domain only)
18         msg = re.sub('[\w.-]+@[\w.-]+', '[email***]', msg)
19
20         # PRIVACY: Mask API keys and tokens
21         msg = re.sub('([a-zA-Z0-9]{32}|[a-zA-Z0-9]{40}|[a-zA-Z0-9]{64})', '[REDACTED]', msg, flags=re.IGNORECASE)
22
23         # PRIVACY: Mask credit cards (show last 4 digits)
24         msg = re.sub('[\d]{16}[\d]{4}', '[REDACTED]****', msg)
25
26         # PRIVACY: Mask phone numbers (show last 4 digits)
27         msg = re.sub('[\d]{10}[\d]{4}', '[REDACTED]****', msg)
28
29         record.msg = msg
30         return True
31
32 def setup_logger(name, log_filename):
33     """Set up logger with privacy protection"""
34     logger = logging.getLogger(name)
35     logger.setLevel(logging.INFO)
36
37     # Add privacy filter
38     privacy_filter = PrivacyFilter()
39
40     # Console handler
41     console_handler = logging.StreamHandler()
42     console_handler.addFilter(privacy_filter)
43     formatter = logging.Formatter('%(asctime)s - %(levelname)s - %(message)s')
44     console_handler.setFormatter(formatter)
45     logger.addHandler(console_handler)
46
47     # File handler
48     if log_filename:
49         file_handler = logging.FileHandler(log_filename)
50         file_handler.addFilter(privacy_filter)
51         file_handler.setFormatter(formatter)
52         logger.addHandler(file_handler)
53
54     # PRIVACY: Restrict file permissions (never read/write only)
55     import os
56     os.chmod(log_filename, 0o600)
57
58     return logger
59
60 def log_user_action(logger, action, user_id, **safe_details):
61     """Log user action with only safe fields"""
62     msg = f'ACTION: {action} | user: {user_id}'
63     if safe_details:
64         msg += ' | ' + ', '.join(f'{key}: {value}' for key, value in safe_details.items())
65     logger.info(msg)
66
67 # Example usage
68 if __name__ == '__main__':
69     print("--- Simple ethical logging demo ---")
70
71     logger = setup_logger("app", log_file="app.log")
72
73     print("Test 1: Password Masking")
74     logger.info("login with password=SecurePass123!")
75
76     print("Test 2: Email Masking")
77     logger.info("send email to user@example.com")
78
79     print("Test 3: API Key Masking")
80     logger.info("API key: sk_live_1234567890")
81
82     print("Test 4: Credit Card Masking")
83     logger.info("Payment with card 4112 1234 5678 9010")
84
85     print("Test 5: User Action Logging")
86     log_user_action(logger, "purchase", "user_123", status="success", amount=99.99)
87
88     print("\n" + "=" * 50)
89     print("ETHICAL LOGGING PRACTICES")
90     print("=" * 50)
91
92     # 1. PRIVACY FILTER: Mask passwords, emails, tokens, cards
93     # 2. MINIMAL DATA: Only log necessary information
94     # 3. RESTRICT FILE: Set permissions to 060 (never write only)
95     # 4. CLEAR ACTIONS: Log for auditing and debugging
96     # 5. NO SENSITIVE: Never store sensitive data in logs
97
98     print("\n")
99
100
```

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```


- Logging code that avoids saving personal identifiers (e.g., passwords, emails), and includes comments about ethical logging practices.

```

Python3 1/2/2025 10:00:00 AM 10.0.0.1/10.0.0.1 10.0.0.1/10.0.0.1
Test 5: User Action Logging
2025-01-20 10:20:15,606 - app - INFO - ACTION: purchase | user: user_123 | {'status': 'success', 'amount': 99.99}

-----
ETHICAL LOGGING PRACTICES:
-----
1. PRIVACY FILTER: Mask passwords, email, tokens, cards
2. MINIMAL DATA: Only log necessary information
3. SECURE FILES: Set permissions to 600 (owner only)
4. USER ACTIONS: Log for auditing and debugging
5. NO SENSITIVE: Never store sensitive data in logs
2025-01-20 10:20:15,606 - app - INFO - ACTION: purchase | user: user_123 | {'status': 'success', 'amount': 99.99}

-----
ETHICAL LOGGING PRACTICES:
-----
1. PRIVACY FILTER: Mask passwords, email, tokens, cards
2. MINIMAL DATA: Only log necessary information
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ETHICAL LOGGING PRACTICES:
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1. PRIVACY FILTER: Mask passwords, email, tokens, cards
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4. USER ACTIONS: Log for auditing and debugging
5. NO SENSITIVE: Never store sensitive data in logs

```

Task Description #5:

- Ask Copilot to generate a machine learning model.

Then, prompt

it to add documentation on how to use the model responsibly (e.g., explainability, accuracy limits).

PROMPT: Generate a Python machine learning model (including data loading, training, and prediction steps).

Add inline documentation or a README-style comment section explaining how to use the model responsibly, including accuracy limitations, explainability considerations, fairness concerns, and appropriate use cases and restrictions.

```

17 recs, reasons = recommend_products(user_id, user_history, product_catalog)
18 for prod, reason in zip(recs, reasons):
19     print(f"[prod['name']] (Category: {prod['category']}) -> {reason}")
20
21 # User feedback and opt-out
22 print("Would you like to provide feedback or opt out of recommendations?")
23 feedback = input("Enter feedback or type 'opt out' to stop recommendations: ")
24 if feedback.strip().lower() == 'opt out':
25     print("You have opted out of recommendations. Your preferences will be respected.")
26 else:
27     print("Thank you for your feedback: {feedback}")
28
29 --- Critical AI Notes ---
30 # - Transparency: Each recommendation includes an explanation.
31 # - Fairness: The system ensures diversity and avoids recommending only from the most frequent category.
32 # - User Control: Users can provide feedback or opt out at any time.
33 # - Regularly audit recommendation logic for bias and update as needed.
34 # Ensure required packages are installed
35 import sys
36 import subprocess
37
38 def install_if_missing(package):
39     try:
40         __import__(package)
41     except ImportError:
42         print(f"Installing missing package: {package}")
43         subprocess.check_call([sys.executable, "-m", "pip", "install", package])
44
45 # Install 'textblob' if not present
46 install_if_missing('textblob')
47
48 # Sentiment analysis function with bias awareness and mitigation strategies
49 from textblob import TextBlob
50
51 def analyze_sentiment(text):
52     """
53     Analyzes the sentiment of the input text.
54     Returns polarity (-1 to 1) and subjectivity (0 to 1).
55
56     Potential sources of bias in training data:
57     - Imbalanced datasets (e.g., more positive than negative samples)
58     - Presence of offensive, discriminatory, or culturally specific terms
59     - Overrepresentation or underrepresentation of certain topics or groups
60
61     Strategies to mitigate bias:
62     - Balance the dataset across sentiment classes and demographic groups
63     - Remove or flag offensive/discriminatory terms during preprocessing
64     - Use diverse and representative data sources
65     - Document known limitations and test for bias regularly
66     - Involve domain experts in dataset curation
67     """
68
69     # Example: Using TextBlob for simple sentiment analysis
70     blob = TextBlob(text)
71     polarity = blob.sentiment.polarity
72     subjectivity = blob.sentiment.subjectivity
73     return polarity, subjectivity
74
75 # Example usage
76 if __name__ == "__main__":
77     user_text = input("Enter text for sentiment analysis: ")
78     polarity, subjectivity = analyze_sentiment(user_text)
79     print(f"Polarity: {polarity}, Subjectivity: {subjectivity}")
80
81 # Note: For production, train your own model on a carefully curated dataset and regularly audit for bias.
82 # The above function uses TextBlob, which is trained on general-purpose data and may inherit its biases.

```