Ground-Work For Ai Assisted Surveillance and Satellite Image Assisted Data Mining to Measure Causality and Report

Actors:

1. **Human Actors:**
   - **Analyst**
   - **Operator**
   - **First Responder**
2. **Non-Human Actors:**
   - **Data Mining Engine**
   - **Satellite Processing Module**

Use Cases:

For Analyst:

1. **Register (Add) Users:**
   - The analyst can register new users into the system.
   - The system prompts the analyst to enter user details.
   - The system stores the user information in the database.
2. **Log-in:**
   - The analyst can log in to the system using their credentials.
   - The system authenticates the credentials and grants access upon successful login.
3. **Configure Parameters:**
   - The analyst can configure system parameters, such as surveillance thresholds and data mining preferences.
   - The system allows the analyst to set up parameters for surveillance, data mining, and satellite image processing.
4. **Generating Reports:**
   - The analyst can generate reports based on surveillance findings, spatial analysis results, and causality insights.
   - The system compiles comprehensive reports summarizing security incidents, environmental factors, and causality analysis results.
5. **Analyze Footage of Objects:**
   - The analyst can analyze surveillance footage for objects, anomalies, or suspicious behavior using AI algorithms.
   - The system processes live or recorded surveillance footage to detect and analyze objects or behavior.
6. **Conduct Data Mining:**
   - The analyst can conduct data mining on integrated surveillance and satellite data.
   - The system identifies correlations, trends, and causal relationships related to security incidents.
7. **Extract Image from Satellite Image Module:**
   - The analyst can extract images from the satellite image processing module for analysis.

      o   The system retrieves and processes satellite imagery to extract relevant images.

8. **Identifying Correlations and Trends to Feed the AI:**
    - The analyst identifies correlations and trends in the data to feed the AI.
    - The system analyzes integrated data to identify patterns and relationships.
9. **Logout:**
    - The analyst can log out of the system to end the session.
    - The system terminates the session and returns to the login screen.

For Operator:

1. **Login:**
    - The operator can log in to the system using their credentials.
    - The system authenticates the credentials and grants access upon successful login.
2. **Access and Review Reports:**
    - The operator can access and review reports generated by the system, which include surveillance findings, spatial analysis results, and causality insights.
    - The system allows the operator to understand the findings and recommendations provided in the reports.
3. **Setting Security Clearance:**
    - The operator can set security clearances for users.
    - The system allows the operator to specify security clearance levels for different users.
4. **Setting Casualty Rate:**
    - The operator can set casualty rates.
    - The system allows the operator to define casualty rates for specific scenarios.
5. **Assign First Responders:**
    - The operator can assign first responders to specific incidents.
    - The system assigns first responders to incidents based on the operator's instructions.
6. **Logout:**
    - The operator can log out of the system to end the session.
    - The system terminates the session and returns to the login screen.

For First Responder:

1. **Login:**
    - The first responder can log in to the system using their credentials.
    - The system authenticates the credentials and grants access upon successful login.
2. **Access Report:**
    - The first responder can access and review reports generated by the system.
    - The system allows the first responder to understand the findings and recommendations provided in the reports.
3. **Save Report:**
    - The first responder can save reports for future reference.
    - The system allows the first responder to save reports locally for later use.
4. **Raise Issue to Operator:**

- o The first responder can raise issues to the operator for further action.
- o The system forwards the issue to the operator for resolution.
5. **Upload Ground Footage:**
   - o The first responder can upload ground footage related to specific incidents.
   - o The system allows the first responder to provide additional data related to incidents.
6. **Logout:**
   - o The first responder can log out of the system to end the session.
   - o The system terminates the session and returns to the login screen.

For Data Mining Engine:

1. **Send Searched Data:**
   - o The data mining engine sends searched data to the analyst.
   - o The system provides the analyst with the results of the data mining process.

For Satellite Image Processing Module:

1. **Send Compressed Footage (Image):**
   - o The satellite image processing module sends compressed footage (image) to the analyst.
   - o The system provides the analyst with processed satellite imagery for further analysis.

This detailed use case breakdown ensures that the system encompasses the needs of its users and effectively integrates AI surveillance, satellite image analysis, data mining, and reporting functionalities to achieve its objectives of enhancing security monitoring, risk assessment, and decision-making.

Entity Relationship Diagram (ERD) Explanation:

1. **User Table:**
   - o Each user has a unique UserID.
   - o A user can be associated with multiple reports (1-to-Many).
   - o A user can be associated with multiple incidents (1-to-Many).
2. **Report Table:**
   - o Each report has a unique ReportID.
   - o Each report is generated by one analyst (Many-to-One).
   - o Reports can be associated with multiple incidents (1-to-Many).
3. **Incident Table:**
   - o Each incident has a unique IncidentID.
   - o Incidents are generated by one operator (Many-to-One).
   - o Each incident can have multiple footages (1-to-Many).
4. **Footage Table:**
   - o Each footage has a unique FootageID.
   - o Each footage is associated with one incident (Many-to-One).

Class Diagram Explanation:

1. **User Class:**
   - Attributes: UserID, Username, Password, Role, SecurityLevel
   - Methods: Register, Login, Logout, ConfigureParameters, SetSecurityClearance
2. **Analyst Class:**
   - Inherits from User Class
   - Methods: GenerateReport, AnalyzeFootage, ConductDataMining, ExtractImage, IdentifyCorrelationsAndTrends
3. **Operator Class:**
   - Inherits from User Class
   - Methods: AccessReport, SetCasualtyRate, AssignFirstResponder
4. **FirstResponder Class:**
   - Inherits from User Class
   - Methods: AccessReport, SaveReport, RaiseIssueToOperator, UploadFootage
5. **DataMiningEngine Class:**
   - Methods: SendSearchedData
6. **SatelliteImageProcessingModule Class:**
   - Methods: SendCompressedFootage

Relationships:

- User and Report: One-to-Many (One user can create multiple reports)
- User and Incident: One-to-Many (One user can be associated with multiple incidents)
- Report and Analyst: Many-to-One (Many reports can be generated by one analyst)
- Report and Incident: One-to-Many (One report can be associated with multiple incidents)
- Incident and Operator: Many-to-One (Many incidents can be managed by one operator)
- Incident and Footage: One-to-Many (One incident can have multiple footages)

This schema lays the groundwork for creating the database tables and classes required for the "Integrated AI Surveillance & Satellite Data Analysis for Causality Reporting" system.

Here's the explanation of the ERD and Class Diagram:

Entity Relationship Diagram (ERD) Explanation:

1. **User Table:**
   - Each user has a unique UserID.
   - Each user can be associated with multiple reports.
   - Each user can be associated with multiple incidents.
   - Cardinality: One-to-Many from User to Report, One-to-Many from User to Incident.
   - Attributes: UserID (Primary Key), Username, Password, Role, SecurityLevel.
2. **Report Table:**
   - Each report has a unique ReportID.
   - Each report is generated by one analyst.

- o Each report can be associated with multiple incidents.
- o Cardinality: Many-to-One from Report to Analyst, One-to-Many from Report to Incident.
- o Attributes: ReportID (Primary Key), AnalystID (Foreign Key - User.UserID), GeneratedDate, Content.
3. **Incident Table:**
    - o Each incident has a unique IncidentID.
    - o Each incident is managed by one operator.
    - o Each incident can have multiple footages.
    - o Cardinality: Many-to-One from Incident to Operator, One-to-Many from Incident to Footage.
    - o Attributes: IncidentID (Primary Key), Date, Location, Description, CasualtyRate, OperatorID (Foreign Key - User.UserID).
4. **Footage Table:**
    - o Each footage has a unique FootageID.
    - o Each footage is associated with one incident.
    - o Cardinality: Many-to-One from Footage to Incident.
    - o Attributes: FootageID (Primary Key), IncidentID (Foreign Key - Incident.IncidentID), FilePath, FileType.

Class Diagram Explanation:

1. **User Class:**
    - o Attributes: UserID, Username, Password, Role, SecurityLevel
    - o Methods: Register, Login, Logout, ConfigureParameters, SetSecurityClearance
2. **Analyst Class:**
    - o Inherits from User Class
    - o Methods: GenerateReport, AnalyzeFootage, ConductDataMining, ExtractImage, IdentifyCorrelationsAndTrends
3. **Operator Class:**
    - o Inherits from User Class
    - o Methods: AccessReport, SetCasualtyRate, AssignFirstResponder
4. **FirstResponder Class:**
    - o Inherits from User Class
    - o Methods: AccessReport, SaveReport, RaiseIssueToOperator, UploadFootage
5. **DataMiningEngine Class:**
    - o Methods: SendSearchedData
6. **SatelliteImageProcessingModule Class:**
    - o Methods: SendCompressedFootage

Relationships:

- • User and Report: One-to-Many (One user can create multiple reports)
- • User and Incident: One-to-Many (One user can be associated with multiple incidents)
- • Report and Analyst: Many-to-One (Many reports can be generated by one analyst)
- • Report and Incident: One-to-Many (One report can be associated with multiple incidents)

- Incident and Operator: Many-to-One (Many incidents can be managed by one operator)
- Incident and Footage: One-to-Many (One incident can have multiple footages)

This schema lays the groundwork for creating the database tables and classes required for the "Integrated AI Surveillance & Satellite Data Analysis for Causality Reporting" system.

Functional Requirements:

1. **User Management:**
   o **Register (Add) Users:**
      - The system should allow an administrator to register new users, including analysts, operators, and first responders.
   o **Login:**
      - Users should be able to log in using their credentials.
   o **Logout:**
      - Users should be able to log out of the system to end their session securely.
2. **Analyst:**
   o **Generate Reports:**
      - Analysts should be able to generate reports based on surveillance findings, spatial analysis results, and causality insights.
   o **Analyze Footage:**
      - Analysts should be able to analyze surveillance footage for objects, anomalies, or suspicious behavior using AI algorithms.
   o **Conduct Data Mining:**
      - Analysts should be able to conduct data mining on integrated surveillance and satellite data.
   o **Extract Image from Satellite Image Module:**
      - Analysts should be able to extract images from the satellite image processing module for analysis.
   o **Identify Correlations and Trends to Feed the AI:**
      - Analysts should be able to identify correlations and trends in the data to feed the AI.
3. **Operator:**
   o **Access and Review Reports:**
      - Operators should be able to access and review reports generated by the system, which include surveillance findings, spatial analysis results, and causality insights.
   o **Set Casualty Rate:**
      - Operators should be able to set casualty rates for specific incidents.
   o **Assign First Responders:**
      - Operators should be able to assign first responders to specific incidents.
4. **First Responder:**
   o **Access Report:**
      - First responders should be able to access and review reports generated by the system.
   o **Save Report:**

- First responders should be able to save reports for future reference.
  - **Raise Issue to Operator:**
    - First responders should be able to raise issues to the operator for further action.
  - **Upload Ground Footage:**
    - First responders should be able to upload ground footage related to specific incidents.
5. **Data Mining Engine:**
   - **Send Searched Data:**
     - The data mining engine should send searched data to the analyst.
6. **Satellite Image Processing Module:**
   - **Send Compressed Footage (Image):**
     - The satellite image processing module should send compressed footage (image) to the analyst.

Non-Functional Requirements:

1. **Performance:**
   - The system should be capable of processing and analyzing real-time surveillance footage with minimal delay.
   - Data mining operations should be completed within a reasonable time frame, even with large datasets.
2. **Scalability:**
   - The system should be designed to handle a large number of users and incidents without compromising performance.
3. **Usability:**
   - The user interface should be intuitive and user-friendly, allowing users to navigate the system with minimal training.
   - The system should provide clear and informative reports that are easy to understand.
4. **Security:**
   - The system should ensure secure authentication and authorization mechanisms to protect sensitive data.
   - User passwords should be stored securely using encryption.
   - Access to the system should be role-based, with different levels of access for analysts, operators, and first responders.
5. **Reliability:**
   - The system should be available 24/7 with minimal downtime for maintenance.
   - The system should be capable of recovering from failures quickly and without data loss.
6. **Integration:**
   - The system should be able to integrate seamlessly with existing surveillance systems and satellite image processing modules.
   - The system should support various data formats for integration.
7. **Accuracy:**

- The system should provide accurate analysis and causality insights to support decision-making effectively.

8. **Maintainability:**
   - The system should be easy to maintain and update to accommodate changes in requirements or technology.

9. **Compliance:**
   - The system should comply with relevant data protection regulations and standards.