Project Schedule: Intrusion Detection System (IDS) Pipeline (4-Week Version)

This schedule outlines the tasks and timeline for developing the Intrusion Detection System (IDS) pipeline, now condensed to fit within 4 weeks. The project consists of four team members with varying experience levels in AI and Data Science. The goal is to build a three-stage machine learning pipeline for classifying network traffic, detecting suspicious activity, and identifying the type of attack.

# Week 1: Dataset Selection & Preprocessing

Duration: 3 Days

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| Task | Team Member(s) | Estimated Time | Description |
| Research and select appropriate datasets (NSL-KDD, UNSW-NB15, etc.) | Member 1 (Beginner) | 1 day | Gather datasets required for model training. |
| Preprocess and clean data (handle missing values, normalization, encoding) | Member 2 (Intermediate) | 2 days | Prepare the dataset for training by handling missing data and encoding categorical variables. |

# Week 1: Traffic Type Classification Model (Model 1)

Duration: 4 Days

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| Task | Team Member(s) | Estimated Time | Description |
| Train traffic type classification model (Random Forest, SVM, etc.) | Member 2 (Intermediate) | 3 days | Train the model to classify traffic types (DNS, HTTP, FTP, etc.). |
| Model evaluation and tuning | Member 3 (Intermediate) | 1 day | Evaluate model performance and optimize hyperparameters. |

# Week 2: Suspicious vs. Benign Detection (Model 2)

Duration: 4 Days

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| Task | Team Member(s) | Estimated Time | Description |
| Train suspicious vs. benign classification model | Member 2 (Intermediate) | 2 days | Train a model to detect suspicious vs. benign traffic. |
| Model evaluation and tuning | Member 4 (Beginner) | 2 days | Evaluate the model using accuracy, precision, recall, and F1-score. |

# Week 3: Attack Type Classification (Model 3)

Duration: 4 Days

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| Task | Team Member(s) | Estimated Time | Description |
| Train attack type classification model (XGBoost, Random Forest) | Member 3 (Intermediate) | 3 days | Train a model to classify attack types (DoS, Probe, etc.). |
| Model evaluation and tuning | Member 4 (Beginner) | 1 day | Evaluate performance with multi-class metrics (precision, recall). |

# Week 4: Full Pipeline Integration & Deployment

Duration: 4 Days

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| Task | Team Member(s) | Estimated Time | Description |
| Integrate all models (Model 1, 2, 3) | Member 2 (Intermediate) | 2 days | Integrate all models into one seamless pipeline. |
| Test full pipeline and ensure flow | Member 4 (Beginner) | 2 days | Ensure the pipeline works from traffic classification to attack classification. |

# Week 4: Web Interface & Deployment

Duration: 4 Days

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| Task | Team Member(s) | Estimated Time | Description |
| Develop the web interface using Streamlit | Member 1 (Beginner) | 2 days | Build a simple web interface to input network traffic and display results. |
| Integrate models into the web app | Member 3 (Intermediate) | 1 day | Integrate trained models into the Streamlit web app for real-time predictions. |
| Test and deploy the web app | Member 2 (Intermediate), Member 4 (Beginner) | 1 day | Test the app and deploy it locally or on a server. |

# Week 4: Evaluation & Reporting

Duration: 3 Days

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| Task | Team Member(s) | Estimated Time | Description |
| Evaluate model performance (metrics, confusion matrix) | Member 2 (Intermediate) | 2 days | Evaluate the performance of each model and document results. |
| Write project report (detailed evaluation, results) | Member 1 (Beginner), Member 4 (Beginner) | 1 day | Compile a final report detailing the project, models, results, and conclusions. |

# Final Project Presentation

Duration: 1 Day

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| Task | Team Member(s) | Estimated Time | Description |
| Prepare slides and presentation | All Members | 1 day | Create a final presentation and demo for the project. |