**CANTILEVER AIML PROTERNSHIP 2025**

**ABSTRACT**

**Project Title:**

Fake News Detection Using Machine Learning

**Team Details:**

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Fake news detection using Machine Learning leverages Natural Language Processing (NLP) and supervised learning algorithms to analyze news articles and determine their authenticity. By training on large datasets containing both real and fake news, the system learns to identify linguistic and stylistic patterns typically associated with misinformation. This approach enhances the ability to automatically filter out deceptive content in real time, supporting fact-checking initiatives and promoting reliable information dissemination.

**1. Fake News Detection Pipeline:**

* **Data Collection**: The system is trained on labeled datasets consisting of both real and fake news articles collected from verified sources.
* **Text Preprocessing**: Standard NLP techniques such as tokenization, stopword removal, and stemming/lemmatization are applied to clean and normalize the text data.
* **Feature Extraction**: A TF-IDF vectorizer is used to convert textual content into numerical representations capturing term importance and frequency.
* **Model Training**: Machine learning models such as the Passive Aggressive Classifier, Naïve Bayes, or Logistic Regression are trained to classify the news as either fake or real.
* **Prediction and Evaluation**: The trained model predicts the authenticity of unseen articles, with accuracy, precision, recall, and F1-score used for evaluation.

**2. Natural Language Processing (NLP) Integration:**

* **Text Vectorization**: TF-IDF captures significant terms that influence classification.
* **Semantic Analysis**: Future extensions may include sentiment analysis or topic modeling to detect subtle biases.
* **Language Normalization**: NLP ensures that the system handles variations in sentence structure and grammar across different sources.

**3. Key Technologies:**

* **Machine Learning**: Passive Aggressive Classifier and other algorithms enable efficient binary classification based on learned text patterns.
* **Natural Language Processing**: Essential for cleaning and analyzing raw textual input to extract meaningful features.
* **Python Libraries**: Scikit-learn, NLTK, pandas, and joblib are used for model training, evaluation, and deployment.

**4. Applications:**

* **Media Verification Tools**: Helps journalists, editors, and platforms verify news content before publishing.
* **Social Media Filtering**: Integrates with content moderation systems to automatically detect and flag misleading articles.
* **Public Awareness Platforms**: Empowers users to verify the credibility of news and make informed decisions based on trustworthy sources.