

Topic Assessment Form
Project ID :

25-26J-515

1. Topic (12 words max)

Multilingual Fake News Detection in Tamil and Sinhala Using AI-Based Verification Framework

2. Research group the project belongs to

SST - Software Systems & Technologies

3. Specialization of the project belongs to

Software Engineering (SE)

4. If a continuation of a previous project:

Project ID	
Year	

5. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

The proliferation of fake news on social media platforms has emerged as a serious global issue, particularly in low-resource language communities such as those using Tamil and Sinhala. These languages suffer from a lack of annotated datasets, limited language-specific natural language processing (NLP) tools, and inadequate research attention, which significantly hampers the development of effective misinformation detection systems. Although multilingual transformer models have improved cross-lingual understanding, most fake news detection systems remain predominantly English-centric and are unable to generalize effectively to regional contexts.

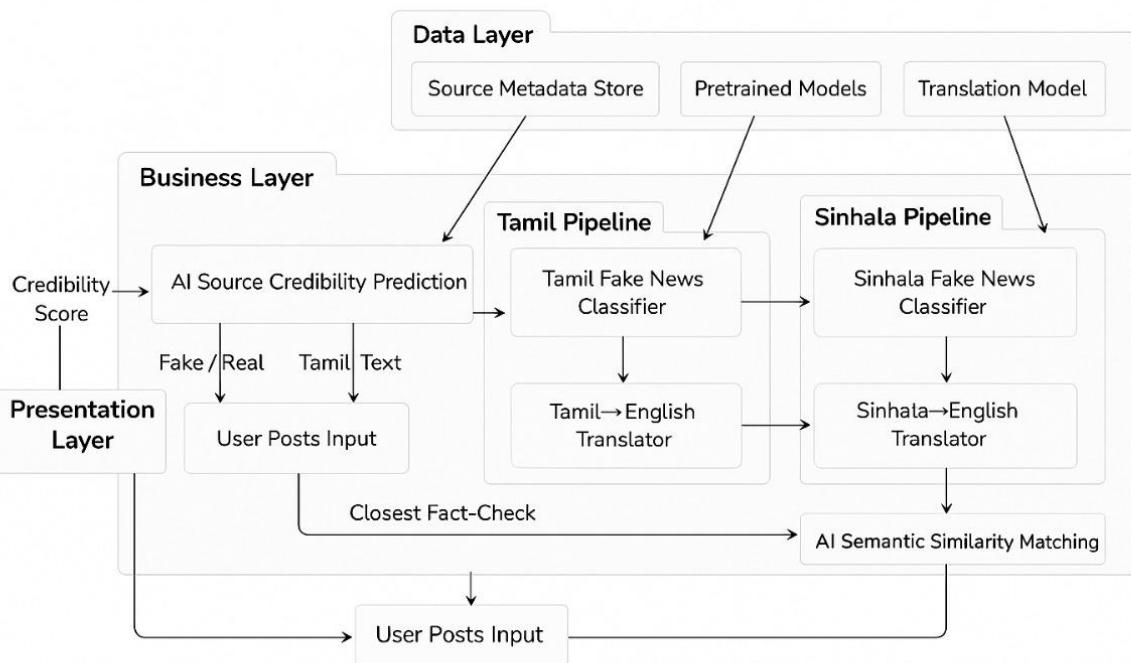
This research aims to develop a multilingual AI-based framework for fake news detection and verification in Tamil and Sinhala media. The proposed system will consist of four integrated modules. First, fake news classification will be performed using fine-tuned multilingual transformers such as XLM-R and MuRIL for Tamil [4] and similar approaches for Sinhala [2][5]. Second, a source credibility prediction model will be developed using structured metadata (e.g., publication history, domain reputation) and traditional supervised learning methods such as Random Forest [6]. Third, the system will employ a semantic similarity module, leveraging sentence embeddings from models like LaBSE or SBERT, to match social media posts against a repository of verified fact-checks [7].

This study will explore the application of transfer learning, multilingual embeddings, and cross-verification techniques to improve performance in low-resource environments. Unlike most prior research focused on monolingual or high-resource languages [1][3], our approach addresses both linguistic diversity and verification challenges. The final system aims to provide explainable outputs and real-time support for social media monitoring in regions such as Sri Lanka and South India, contributing significantly to the field of multilingual misinformation detection.

- References:**
- [1] R. Rahutomo and R. R. Sitorus, "A Comparison of Text Classification Methods: Towards Fake News Detection for Indonesian Websites," in *2022 International Conference on Data and Software Engineering (ICoDSE)*, Malang, Indonesia, 2022. [Online]. Available: <https://ieeexplore.ieee.org/document/9918702>
 - [2] K. Vidanagama and N. Perera, "Sinhala Language Fake News Detection In Social Media Using Autoencoder-Based Method," in *2023 10th International Conference on Industrial and Information Systems (ICIIS)*, Sri Lanka, 2023. [Online]. Available: <https://ieeexplore.ieee.org/document/10215013>
 - [3] H. H. Singh and M. Y. Khan, "AI-Assisted Deep NLP-Based Approach for Prediction of Fake News From Social Media Users," in *2023 7th International Conference on Computing Methodologies and Communication (ICCMC)*, 2023. [Online]. Available: <https://ieeexplore.ieee.org/document/10086954>
 - [4] D. M. W. K. Dissanayake et al., "Hybrid Semantic and Contextual Analysis for Multilingual Fake News Detection Using Deep Learning," in *2024 International Conference on Advanced Technologies (ICAT)*, 2024. [Online]. Available: <https://ieeexplore.ieee.org/document/10986464>
 - [5] K. G. S. N. Prabhath and W. A. S. Wijesinghe, "A Hybrid Approach for Detection of Fake News in Sinhala Text," in *2023 6th International Conference on Natural Language Processing (ICON)*, 2023. [Online]. Available: <https://ieeexplore.ieee.org/document/10024086/>
 - [6] J. P. Kumara and N. A. Tissera, "A Hierarchical Framework for Fake News Detection Using Semantic Analysis and Source Reliability," in *2024 IEEE International Conference on Computer and Information Sciences (ICCIS)*, 2024. [Online]. Available: <https://ieeexplore.ieee.org/document/10489413>
 - [7] A. S. Perera and R. D. Liyanage, "A Novel Approach for Tweet Similarity in a Context-Aware Fake News Detection Model," in *2024 IEEE Conference on Data Science and Advanced Analytics (DSAA)*, 2024. [Online]. Available: <https://ieeexplore.ieee.org/document/10938537>

6. Brief description of the nature of the solution including a conceptual diagram (250 words max)

The proposed solution is a modular AI system consisting of four key components: [1] a Tamil fake news classifier using fine-tuned XLM-R/mBERT, [2] a Sinhala version using the same architecture, [3] a metadata-based credibility predictor using Random Forest/XGBoost, and [4] a semantic similarity matcher using LaBSE or Sentence-BERT. These components are integrated into a FastAPI-based backend system. Each text entered is first classified as real/fake, followed by a credibility score for the source, and finally verified against trusted news using embedding-based similarity. The system is trained on translated and curated datasets and uses pretrained models fine-tuned for each task. This provides multilingual support, explainability, and robustness in low-resource settings.

Multilingual Fake News Detection System – Conceptual Overview


7. Brief description of specialized domain expertise, knowledge, and data requirements (300 words max)

This project resides at the intersection of Natural Language Processing (NLP), Machine Learning (ML), and multilingual AI systems for under-resourced languages like Tamil and Sinhala. The specialized expertise required includes:

A deep understanding of transformer-based architectures (e.g., XLM-R, MuRIL, mBERT) and their fine-tuning strategies for classification tasks in low-resource contexts.

Familiarity with core NLP techniques such as tokenization, embedding generation, and sequence classification tailored for Tamil and Sinhala.

Knowledge of supervised ML models (e.g., Random Forest, SVM) to analyze structured metadata (e.g., account behavior, domain reputation) for source credibility scoring.

Proficiency in semantic similarity computation using advanced sentence embedding models like Sentence-BERT and LaBSE, including vector search with FAISS or cosine similarity.

To build and validate the system, the project requires:

Labeled fake/real news datasets in Tamil and Sinhala (to be collected manually or translated from reliable datasets using tools like IndicTrans2/Google Translate, followed by human correction).

Source metadata (e.g., follower count, posting history) from social media/news domains.

Curated fact-checking datasets from reputable sources such as FactCheck.lk, BoomLive, and AltNews, enabling semantic matching and verification.

We are acquiring domain expertise through:

Research papers (IEEE, ACL, arXiv) on fake news detection in low-resource languages.

Online certifications and coursework on NLP (e.g., DeepLearning.AI, Hugging Face).

External guidance from academic supervisors and industry mentors, with domain review support from a local NLP researcher fluent in Tamil and Sinhala fact-checking efforts.

The technical stack includes Hugging Face Transformers, FastAPI, Scikit-learn, PyTorch, and SQLite/JSON for storage.

Online data collection sources

[1] FactCheck.lk – Sri Lanka-focused fact-checking platform

<https://factcheck.lk/>

[2] BoomLive.in – Multilingual Indian fact-checking platform

<https://www.boomlive.in/>

[3] AltNews.in – Indian-based platform for detecting fake news and misinformation

<https://www.altnews.in/>

[4] AFP Fact Check (Sri Lanka Section) – Global news verification service including Tamil/Sinhala content

<https://factcheck.afp.com/>

[5] Google Translate – Commonly used for low-resource language data augmentation

<https://translate.google.com/>

8. Objectives and Novelty

Main Objective

To build an AI-based multilingual framework for detecting and verifying fake news in Tamil and Sinhala using classification, credibility scoring, and semantic similarity.

Member Name with Registration No	Sub Objective	Tasks	Novelty
Ashokan.K (IT22242204)	Build AI-based Tamil Fake News Detection Module using Text Classification	<ul style="list-style-type: none"> • Collect and curate fake/real news articles in Tamil • Translate and augment data from English sources • Preprocess the data and tokenize using XLM-R • Fine-tune multilingual transformers (e.g., XLM-R, MuRIL) • Evaluate model using accuracy, F1-score • Export trained model for use in backend 	<p>Prior research has predominantly focused on monolingual or high-resource languages (especially English or Hindi). Tamil fake news datasets are scarce, and most existing models fail to generalize well due to lack of training in Tamil-specific linguistic nuances. This component fine-tunes multilingual transformers specifically on Tamil data, which has not been explored in-depth in academic or production-grade systems. This is among the first few attempts to build a dedicated Tamil fake news classifier using transfer learning on pre-trained multilingual models.</p>

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TRANCHAL C.N (IT22172228)	Build AI-based Sinhala Fake News Detection Module using Text Classification	<ul style="list-style-type: none"> • Collect and curate fake/real news articles in Sinhala • Translate and augment data from English sources • Preprocess the data and tokenize using XLM-R • Fine-tune multilingual transformers (e.g., XLM-R, MuRIL) • Evaluate model using accuracy, F1-score • Export trained model for use in backend 	<p>Sinhala is one of the most underrepresented languages in NLP research. Most existing models completely exclude Sinhala or perform poorly due to tokenization and vocabulary mismatch. This work represents a pioneering effort in creating a Sinhala-specific fake news classifier using multilingual transformers, taking advantage of transfer learning.</p>
M.N.H RAHMAN (IT22591852)	To improve fake news detection by checking how trustworthy the news source is using basic information and past behavior.	<ul style="list-style-type: none"> • Collect basic information about the source, such as follower count, account age, and website/domain details. • Check past posts to find signs of fake or sensational content. • Turn the collected data into useful features for machine learning (like fake word ratio, report count). • Train a machine learning model to predict how trustworthy the source is. 	<p>Previous research in fake news often relies purely on content-based analysis. Very few systems incorporate structured data about the source (metadata-based trust prediction). This component augments text classification with source-level credibility assessment, offering a multi-dimensional evaluation of news authenticity. Especially in multilingual, low-resource settings, using non-textual features is novel because it compensates for limited training data in Tamil/Sinhala.</p>

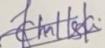
			By doing this, the system reduces false positives (news that appears fake but comes from credible sources) and increases explainability.
M.H.M. ARSHAD (IT22595744)	To enable AI-based semantic matching of news posts with verified sources in Tamil and Sinhala to assess factual similarity and support fake news verification.	<ul style="list-style-type: none"> • Collect a dataset of verified news articles and known misinformation from fact-checking organizations • Preprocess and translate content into unified representations using multilingual NLP tools • Train a semantic embedding model to represent news content in vector space for similarity comparison. • Implement cosine similarity or FAISS-based nearest neighbor search to retrieve closest verified claims. • Integrate the semantic similarity module into the fake news detection framework to enhance explainability. 	<p>Past systems largely used surface-level keyword matching or manual rule-based comparison. This module introduces semantic-level AI verification, which is language-agnostic and ideal for low-resource multilingual settings. I'm using cross-lingual sentence embeddings (LaBSE/SBERT) to match Tamil and Sinhala posts with verified English or regional fact-checks. This brings explainability and robustness, as the model can highlight matched facts, offering more than just binary prediction. First to apply LaBSE in Tamil and Sinhala news verification context, which has not been thoroughly explored in multilingual misinformation literature.</p>

9. Individual component description of how it is complied with the specialization.

Member Name with Registration No	Description
Ashokan.K (IT22242204)	<p>This component detects fake news in Tamil using AI-based text classification, addressing misinformation in a low-resource language. It uses a pre-trained multilingual transformer (XLM-RoBERTa) fine-tuned on collected and annotated Tamil news data, with careful text preprocessing for normalization and tokenization.</p> <p>SE Specialization-related tasks include:</p> <ul style="list-style-type: none"> • Clean, modular data preprocessing scripts • Machine Learning engineering for model training and integration • Deployment as a microservice for independent operation • Building a RESTful API for real-time predictions • Using Docker for containerization and portability • Designing with modularity and scalability for future language support • Applying HCI principles for clear API responses
TRANCHAL C.N (IT22172228)	<p>This component implements a Sinhala fake news detection module using a pre-trained multilingual model (XLM-RoBERTa) to classify news as real or fake. It includes key SE tasks such as data preprocessing, model integration, and modular system design.</p> <p>SE Specialization-related tasks include:</p> <ul style="list-style-type: none"> • Software Architecture for modular integration • Microservices for independent deployment • API development for real-time prediction • Docker for containerization • ML Engineering for model fine-tuning • HCI for user-friendly API responses
M.N.H RAHMAN (IT22591852)	<p>The source credibility analysis component applies key machine learning techniques to assess the trustworthiness of news sources, aligning closely with the Machine Learning specialization. It uses structured metadata such as follower count, account age, posting behavior, and domain reputation to engineer meaningful features. A classification model—such as Random Forest or SVM—is trained on this data to predict whether a source is credible or not. The process involves core ML concepts like feature selection, model training, evaluation, and interpretability. By focusing on behavioral patterns rather than text content, this component demonstrates how machine learning can be</p>

	<p>used for intelligent decision-making and early detection of fake news. It reflects practical use of ML in real-world data environments, supporting critical thinking and automated reasoning tasks central to the specialization.</p> <p>SE Specialization-related tasks include:</p> <ul style="list-style-type: none"> • Designing the component with modular software architecture for easy integration. • Deploying the model as a microservice to support scalability and independent updates. • Using Docker for containerization, ensuring consistent deployment environments. • Implementing API development for real-time data input and output. • Applying HCI concepts to make the system's output interpretable and usable by other components or end users.
M.H.M.ARSHAD (IT22595744)	<p>The semantic similarity matching component applies advanced machine learning and natural language processing (NLP) techniques, aligning with the Artificial Intelligence specialization. It generates semantic embeddings of Tamil and Sinhala news articles using transformer-based multilingual models like LaBSE or XLM-R. These embeddings enable the system to measure meaning-based similarity between user content and trusted news sources. The approach involves AI concepts such as language encoding, vector representations, and similarity search with FAISS or cosine distance. This component supports intelligent reasoning and fact verification, demonstrating AI's practical application in social media.</p> <p>SE Specialization-related tasks include:</p> <ul style="list-style-type: none"> • Designing a modular architecture for embedding generation and similarity search. • Deploying as a microservice to handle real-time similarity queries. • Containerizing the service with Docker for consistent deployment. • Developing efficient APIs for integration with other system components. • Considering HCI principles to ensure clear and actionable similarity results.

10. Supervisor details

	Title	First Name	Last Name	Signature
Supervisor	Ms.	Hansi	D e Silva	
Co-Supervisor	Ms.	Chathushki	Chathumali	
External Supervisor	Ms.	Archchana	Sindhujan	

Summary of external supervisor's (if any) experience and expertise

This part is to be filled by the Topic Screening Staff members.

- a) Does the chosen research topic possess a comprehensive scope suitable for a final-year project?

Yes	No	
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- b) Does the proposed topic exhibit novelty?

Yes	No	
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- c) Do you believe they have the capability to successfully execute the proposed project?

Yes	No	
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- d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes	No	
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- e) Supervisor's Evaluation and Recommendation for the Research topic:

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Topic Assessment Form

Acceptable: Mark>Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes*	
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

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Staff Member's Name	Signature

***Important:**

1. According to the comments given by the evaluator, make the necessary modifications and get the approval by the **Evaluator**.
2. If the project topic is rejected, identify a new topic, and request the RP Team for a new topic assessment.