Research Project
(IT4010)

Group Assessment File

Project ID: 2022-056

Supervisor: Dr. Lakmini Abeywardhana

Project Title:

Enhancing conversational AI model performance and explainability for Sinhala-English bilingual speakers.

Group Details:

Student ID	Student Name
IT19069432	Dissanayake D.M.I.M.
IT19064932	Hameed M.S.
IT19075754	Jayasinghe D.T.
IT19051208	Sakalasooriya S.A.H.A.

Research Project (IT4010)

Student Assessment File

Project ID : 2022-056

Student ID : IT19069432

Student Name : Dissanayake D.M.I.M.

Research Domain: Natural Language Processing

Project Title

Enhancing conversational AI model performance and explainability for Sinhala-English bilingual speakers.

Project Subtitle

Dual Interpretable Model-Agnostic Explanations: Using global explanations to generate local interpretations in intent classification models using explainable AI.

Individual Component Abstract

Developing algorithms using explainable AI (XAI) techniques to offer both global and local model explanations for black-box intent classifiers used in conversational AIs. The main tasks of the research component can be named as developing an algorithm to generate local explanations based on the global explanations using it as a weighting term, DIME (Dual Interpretable Model-agnostic Explanations), and also developing a strategy to calculate feature importance for individual tokens in the training data relevant to a specific intent (class) or relevant to all the intents, and finally allowing to explore the model explanations for any user input and visualize the model explanations in a human-interpretable way.

Research Project (IT4010)

Student Assessment File

Project ID : 2022-056

Student ID : IT19064932

Student Name : Hameed M.S.

Research Domain: Natural Language Processing

Project Title

Enhancing conversational AI model performance and explainability for Sinhala-English bilingual speakers.

Project Subtitle

Enabling code-less maintenance and machine learning model performance evaluation for non-machine learning experts.

Individual Component Abstract

Developing an efficient and code-less approach to improving training data of the conversational AI assistant via eliminating the need to interact with backend and implementing efficient model testing/evaluation technique with the zero-coding approach to allow non-machine-learning experts to easily improve the conversational AI assistant models. The main tasks of the research component are, finding the best possible approach to allow training data improvements to be done without any coding knowledge or manually interacting with the backend, and also providing a way to efficiently re-train and deploy new machine learning models of the conversational AI assistant for non-technical users, and evaluating machine learning models and designing an algorithm to automatically identify any overfitting or underfitting scenarios in evaluation reports generated by RASA and indicating them in the frontend.

Research Project (IT4010)

Student Assessment File

Project ID : 2022-056

Student ID : IT19075754

Student Name : Jayasinghe D.T.

Research Domain: Natural Language Processing

Project Title

Enhancing conversational AI model performance and explainability for Sinhala-English bilingual speakers.

Project Subtitle

Developing rule-based approaches to process code-mixed textual data and make word embeddings models lightweight using token mapping.

Individual Component Abstract

Developing rule-based algorithms to handle code-switched textual data efficiently, make word embeddings models lightweight, and handle out-of-vocabulary tokens (OOV). The main tasks of the research components are, developing an algorithm that uses character-mapping to enable end-users to interact with the conversational AI assistant using code-switching (a rule-based keystroke mapper), and also developing an algorithm using "token mapping" which can be used to handle out-of-vocabulary (OOV) tokens in code-mixed training data due to less amount of training data available, and demonstrating how lightweight monolingual word embeddings models that need less amount of training data can handle code-mixed training data tokens, and attaching the algorithm to the conversational AI assistant's NLU pipeline before the word embeddings components.

Research Project (IT4010)

Student Assessment File

Project ID : 2022-056

Student ID : IT19051208

Student Name : Sakalasooriya S.A.H.A.

Research Domain: Natural Language Processing

Project Title

Enhancing conversational AI model performance and explainability for Sinhala-English bilingual speakers.

Project Subtitle

Utilizing reverse-stemming and other techniques to develop a data annotation tool for code-mixed text data for efficient custom entity tagging.

Individual Component Abstract

Building a Custom Entity Recognizer for Sinhala-English code-mixed corpus based on different techniques including reverse-stemming, cosine similarity, n-grams, etc. The main tasks of this component are, building a data annotating tool to annotate entities easily without having to tag each entity in the training dataset manually, and exploring different approaches to build tools such as n-grams, reverse-stemming, word-wise cosine similarity algorithms to effectively find different variations of the same token that share the same base form, and also evaluating the performance of the annotating tool for each different approach mentioned above, and finally designing a deep learning custom entity recognition model using the spaCy library to detect domain-specific custom entities in Sinhala-English code-mixed dataset and attaching it to the conversational AI.