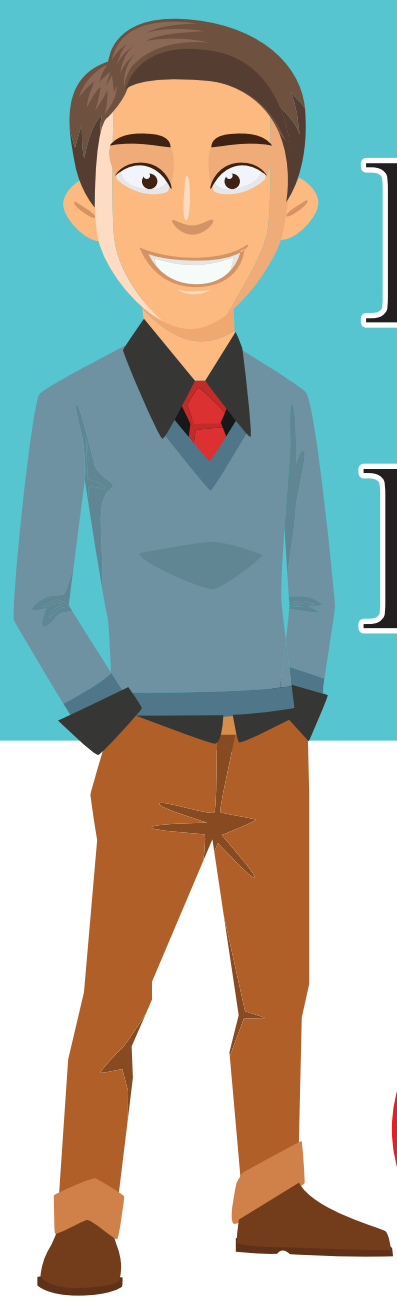
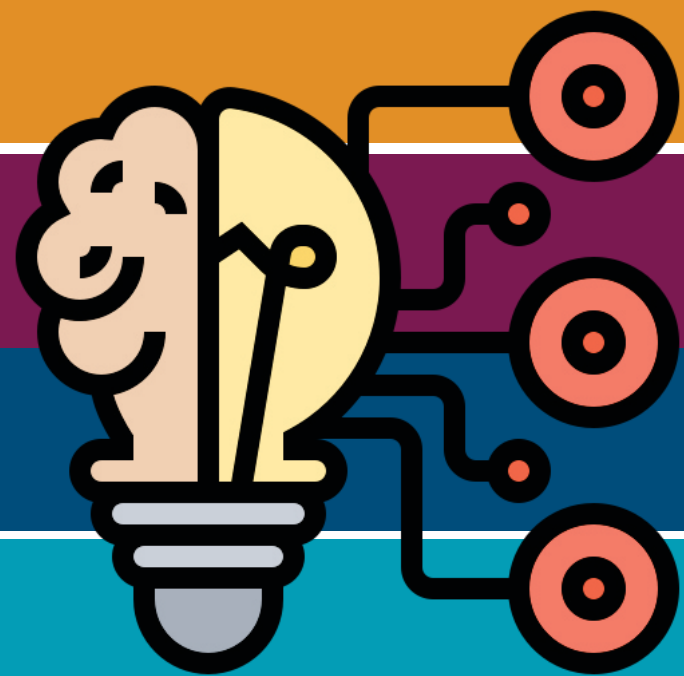




Development and Application of Hybrid Deep Learning Model for (ABSA)

-  **Massive Volume of Data**
-  **Unstructured Social Media Data**
-  **Lack of Aspect-Level Insight**
-  **Shift in Sentiment Over Time**

1. Problem



2. Methods

Data Collection

252,410 McDonald's-related tweets
● Oct 2023-May 2024
● Oct 2024 – May 2025

Data Annotation

1,000 tweets manually labeled for:
● Aspect category
● Broad Thematic Category
● Sentiment Polarity

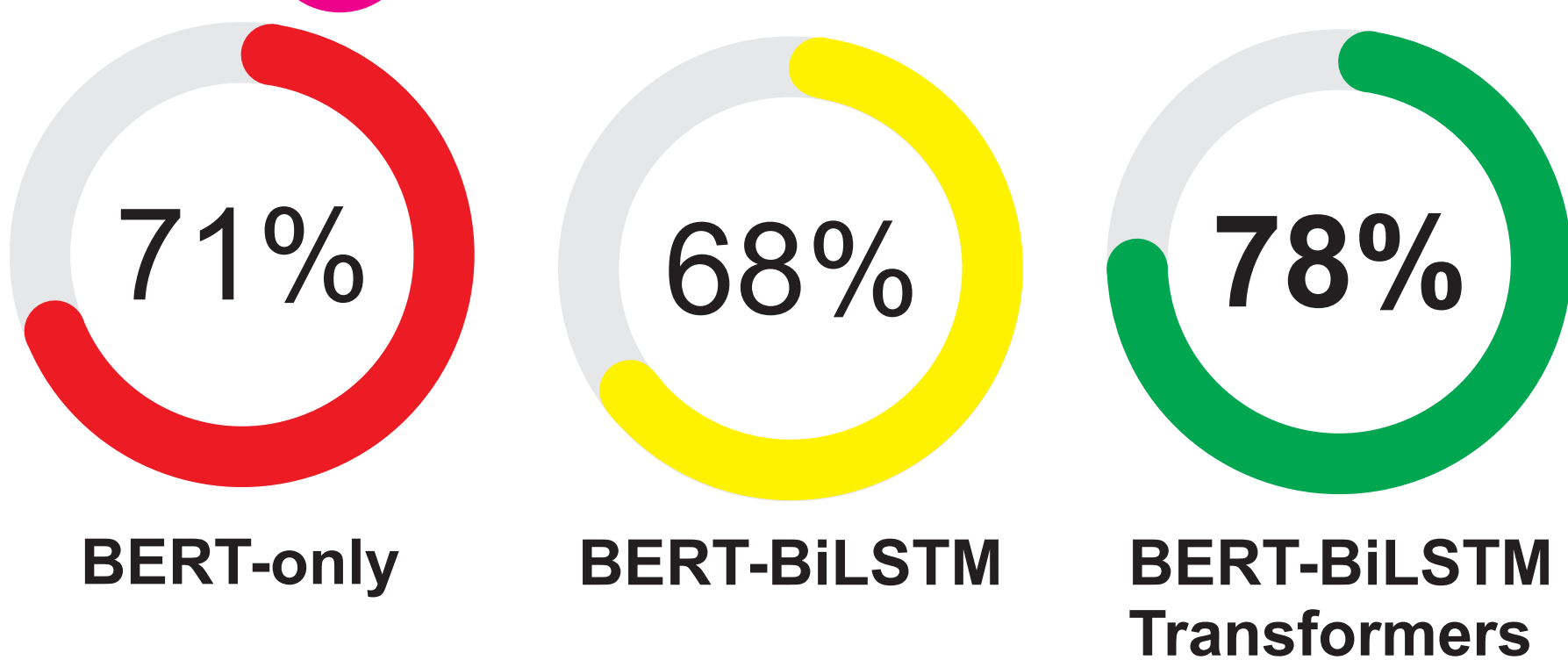
Model Development

BERT-BiLSTM-Transformers(Hybrid DL Model)
SMOTE (Handling Class Imbalance)
LIME, SHAP and Attention Visualization (Explainability)

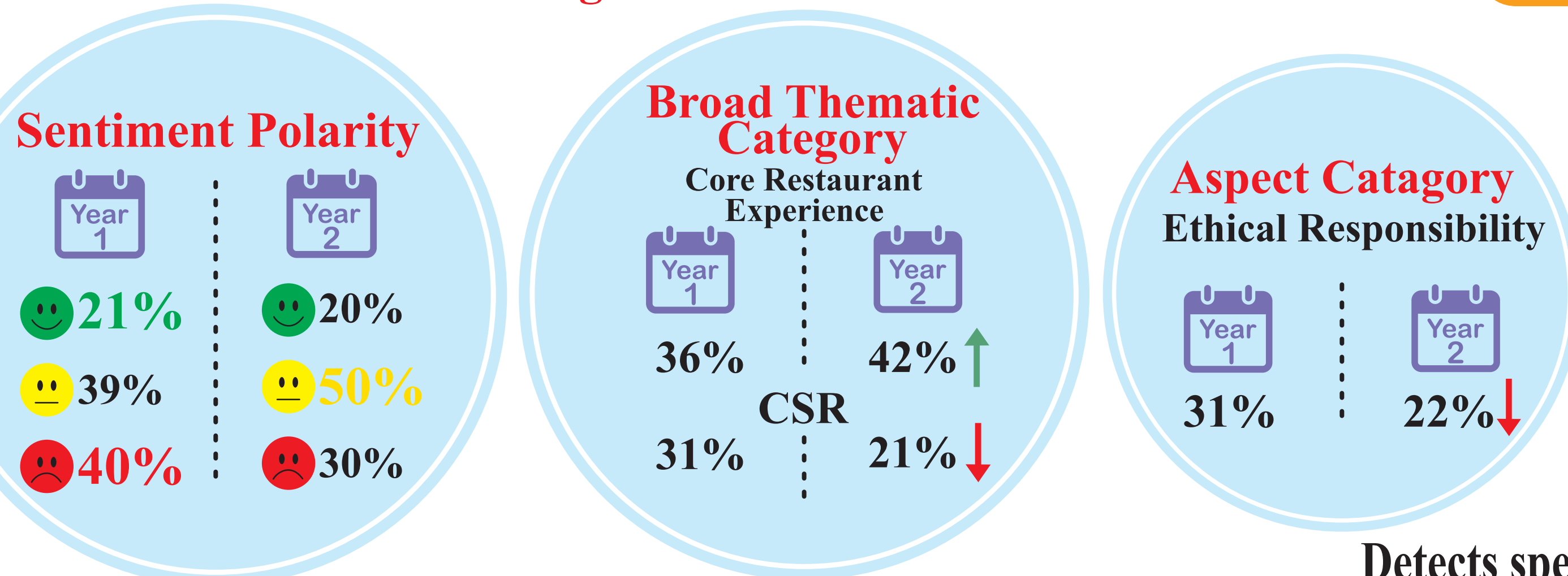
Model Deployment

200,000 randomly selected McDonald's related tweets

A Model Performance (F1-Score)



B Deployment of Real-World Twitter Data Shifts in Negative Sentiment



3. Results



Detects specific pain points (e.g., food, service)

Transparent predictions via explainable AI (LIME, SHAP, Attention Visualization)

Real-time feedback tracking

Scalable & affordable model development

Supports strategic decisions & customer retention

4. Advantages