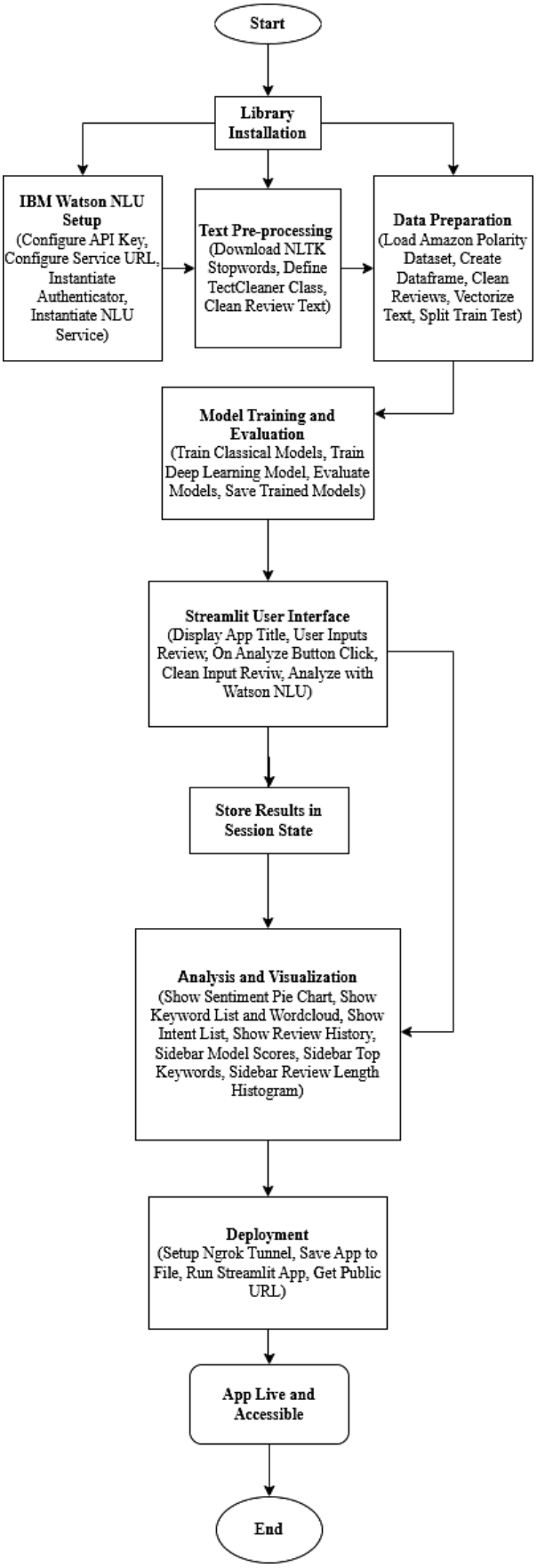
Design-Flow Chart

This project, titled "Artificial Intelligence & Machine Learning: Cognitive Customer Insights Using IBM Watson," focuses on leveraging advanced AI and ML techniques to extract valuable insights from unstructured customer feedback. The core objective is to transform raw product reviews into actionable intelligence, enabling businesses to make informed decisions and enhance customer satisfaction. By automating the analysis of large volumes of text, the system addresses the challenge of manually sifting through feedback, providing a more efficient and effective approach to understanding customer sentiments and needs.

The methodology involves a comprehensive pipeline, starting with data acquisition from the amazon_polarity dataset, followed by meticulous text preprocessing to clean and normalize the review content. Feature extraction is performed using TF-IDF, preparing the data for machine learning models.[1] Both classical machine learning algorithms—Logistic Regression, Decision Tree, and Random Forest—and a Deep Learning model built with Keras were developed and evaluated for sentiment classification. A key aspect of the project is the integration of IBM Watson Natural Language Understanding (NLU), which powers the system's ability to perform sophisticated sentiment analysis, extract relevant keywords, and identify underlying customer intents from the review text.

The developed system is deployed as an interactive web application using Streamlit, providing a user-friendly interface for real-time customer review analysis. Users can input product reviews and instantly receive insights into sentiment, key discussion points, and inferred intentions. The application also includes visualizations such as sentiment distribution pie charts and keyword word clouds, along with model performance metrics, offering a holistic view of customer feedback trends. This interactive dashboard empowers businesses to quickly grasp customer perceptions, identify areas for improvement, and strategically respond to market demands.


Start
Library Installation
IBM Watson NLU Setup (Configure API Key, Configure Service URL, Instantiate Authenticator, Instantiate NLU Service)
Text Pre-processing (Download NLTK Stopwords, Define TectCleaner Class, Clean Review Text)
Data Preparation (Load Amazon Polarity Dataset, Create Dataframe, Clean Reviews, Vectorize Text, Split Train Test)
Model Training and Evaluation (Train Classical Models, Train Deep Learning Model, Evaluate Models, Save Trained Models)
Streamlit User Interface (Display App Title, User Inputs Review, On Analyze Button Click, Clean Input Reviw, Analyze with Watson NLU)
Store Results in Session State
Analysis and Visualization (Show Sentiment Pie Chart, Show Keyword List and Wordcloud, Show Intent List, Show Review History, Sidebar Model Scores, Sidebar Top Keywords, Sidebar Review Length Histogram)
Deployment (Setup Ngrok Tunnel, Save App to File, Run Streamlit App, Get Public URL)
App Live and Accessible
End

Flow Chart