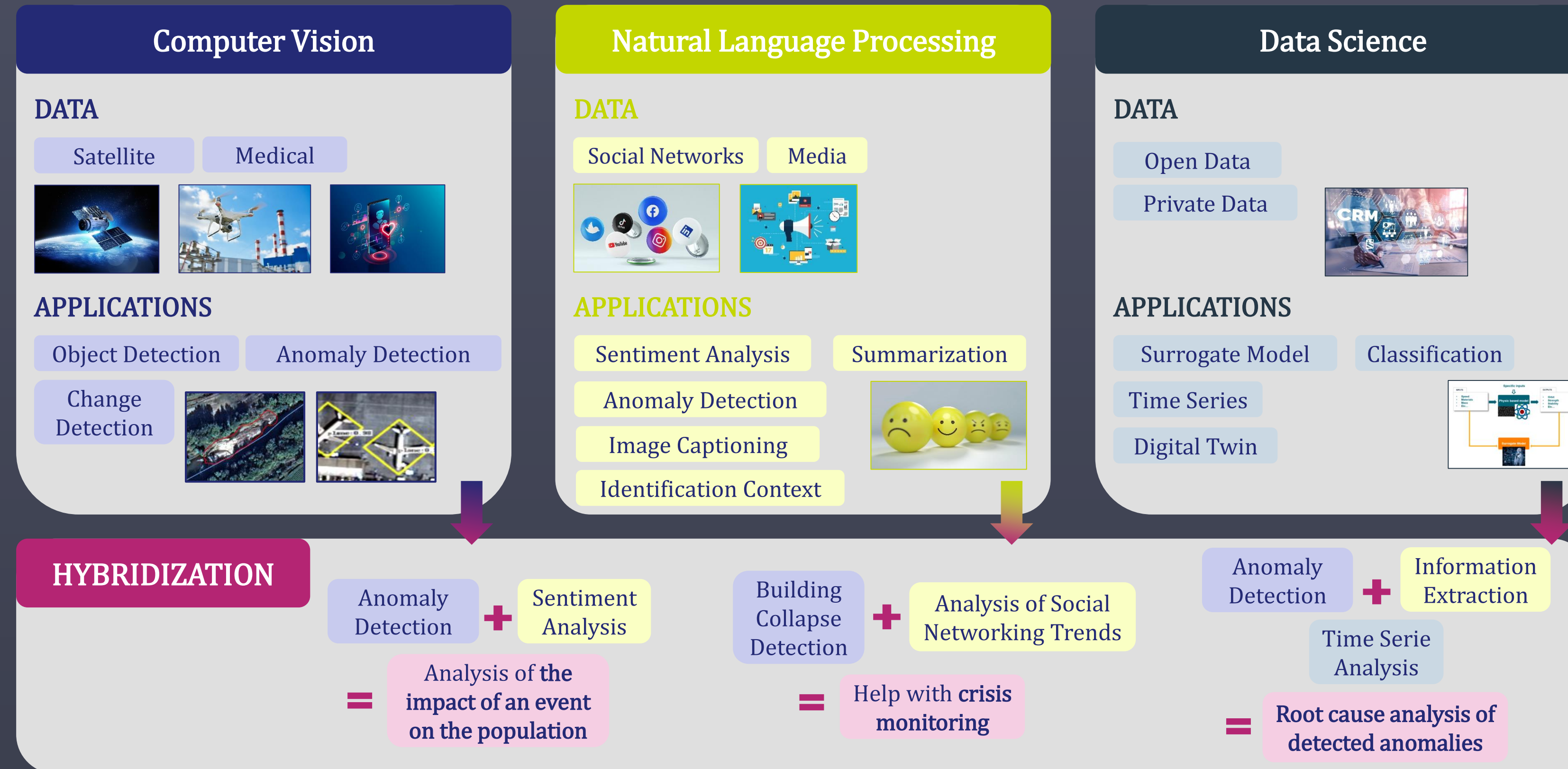# AUGMENTED REMOTE SENSING WITH SMART HYBRIDIZATION FROM EXOGENOUS DATASOURCES

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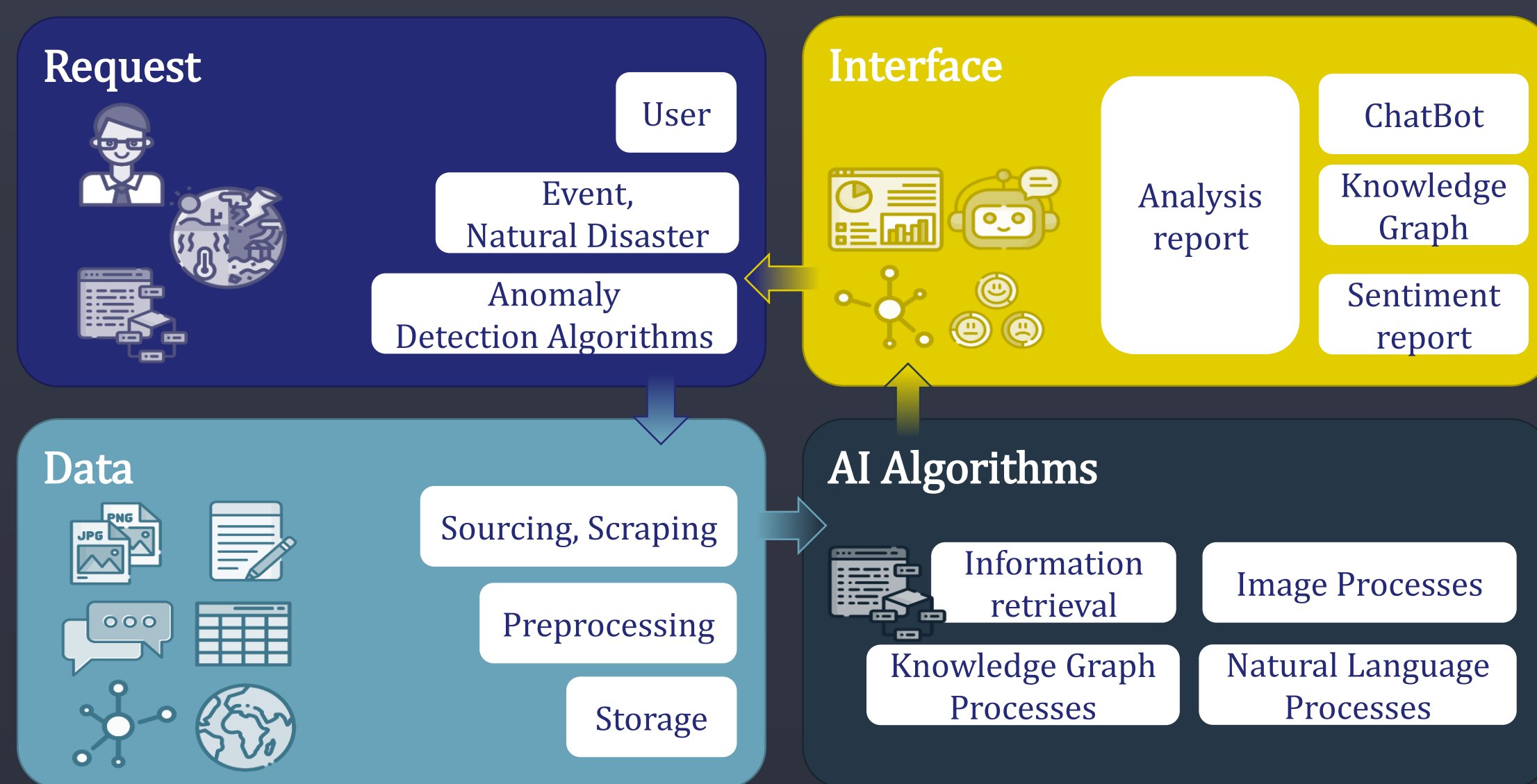
INTRODUCTION

The aim of this work is to investigate the potential enhancements resulting from the augmentation and hybridization of data and methods concerning spatial imagery. To achieve this, we will leverage diverse data sources such as social networks, online databases, and media. Furthermore, we hybridize our methods with Earth observation techniques, natural language processing, and data science methodologies. The chosen use case for this study is the earthquake that occurred in Turkey and Syria in February 2023.

Computer Vision

DATA
- Satellite
- Medical

APPLICATIONS
- Object Detection
- Anomaly Detection
- Change Detection

Natural Language Processing

DATA
- Social Networks
- Media

APPLICATIONS
- Sentiment Analysis
- Summarization
- Anomaly Detection
- Image Captioning
- Identification Context

Data Science

DATA
- Open Data
- Private Data

APPLICATIONS
- Surrogate Model
- Classification
- Time Series
- Digital Twin

HYBRIDIZATION

Anomaly Detection + Sentiment Analysis = Analysis of the impact of an event on the population

Building Collapse Detection + Analysis of Social Networking Trends = Help with crisis monitoring

Anomaly Detection + Information Extraction / Time Serie Analysis = Root cause analysis of detected anomalies
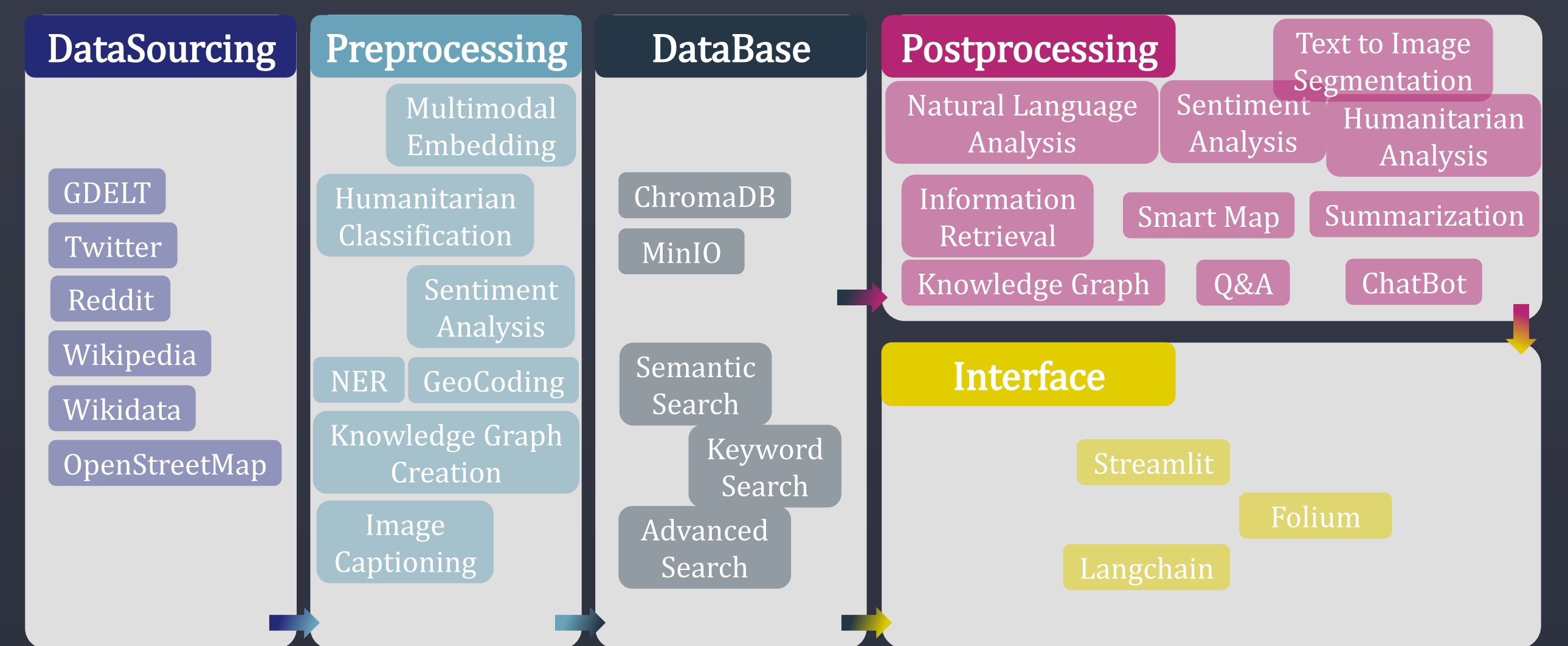
OPERATING

We present a four-stage pipeline in the context of data-driven solution, encompassing request handling, data extraction, AI algorithms, and user interface components.

Request
- User
- Event, Natural Disaster
- Anomaly Detection Algorithms

Interface
- ChatBot
- Analysis report
- Knowledge Graph
- Sentiment report

Data
- Sourcing, Scraping
- Preprocessing
- Storage

AI Algorithms
- Information retrieval
- Image Processes
- Knowledge Graph Processes
- Natural Language Processes

TECHNICAL OVERVIEW

We developed a technical solution, which consists of five key stages : data sourcing, pre-processing, database management, post-processing and interface. In particular, we implemented Knowledge Graph, NLP and CV processes, embedding and Geocoding solutions to augment and hybridize the data.

DataSourcing
- GDELT
- Twitter
- Reddit
- Wikipedia
- Wikidata
- OpenStreetMap

Preprocessing
- Multimodal Embedding
- Humanitarian Classification
- Sentiment Analysis
- NER
- GeoCoding
- Knowledge Graph Creation
- Image Captioning

DataBase
- ChromaDB
- MinIO
- Semantic Search
- Keyword Search
- Advanced Search

Postprocessing
- Natural Language Analysis
- Sentiment Analysis
- Text to Image Segmentation
- Humanitarian Analysis
- Information Retrieval
- Smart Map
- Summarization
- Knowledge Graph
- Q&A
- ChatBot

Interface
- Streamlit
- Folium
- Langchain

USE CASE

Smart Map

Smart Map

Homepage

Smart Augmented Remote Sensing

Welcome to the Disaster Map App! This app provides a smart map augmented with text data from Reddit, Twitter, and GDELT.

Smart Map

The smart map below shows the real-time data related to the selected disaster type and date range.

Map visualization goes here

Data Sources

The text data from the following sources is used to augment the smart map:

Reddit

Reddit provides valuable user-generated content related to the disaster. The app analyzes relevant posts and comments to extract useful information.

Twitter

Analytics

Analytics

Knowledge

Multimodal