**Kreative Time Box Project Tech Stack**

**Programming Language:**

* **Python**

**Document & Image Handling:**

* **Camelot**
* **OpenCV**
* **Pillow**
* **pdfplumber**
* **pypdf2**

**Used for PDF table extraction, image processing, and handling document I/O operations.**

**Deep Learning/Layout Models/Preprocessing/CNN:**

* **Gemma 3 12B**
* **LLama**
* **ollama server**
* **Gemini API**

**API for Text Extraction Using advance Vision Models**

**API Development:**

* **FastAPI**
* **SwaggerUI**

**API & Response**

**Dashboard / Visualization:**

* **Pandas**
* **matplotlib**
* **seaborn**
* **streamlit**

**Source Control:**

* **Git**

**2. Backend & APIs**

* **FastAPI – Backend framework for building endpoints like /upload, /extract, /validate, etc.**
* **Swagger – Used for API documentation.**
* **Python – Core language for OCR logic, PDF handling, and ML integration.**
* **n8n – Workflow automation tool for backend or API integration.**
* **Git – Version control for source code.**

**3. Fraud & Duplicate Detection**

* **Rule-Based System – Flags suspicious patterns like same amount/supplier.**

**4. Expense Categorization & Learning**

* **RandomForest / LogisticRegression / LSTM – Used to classify transaction categories based on supplier, amount, and description.**
* **Feature Engineering – Includes n-grams, amount ranges, and supplier-based feature**
* **Feedback System – Enables retraining based on corrected predictions.**
* **Rule Engine (JSON-based) – Allows overriding model predictions with user-defined rules.**

**5. Transaction Matching**

* **ML Similarity Scoring – Binary classification model trained on receipt and bank transaction pairs.**
* **Threshold Logic + Confidence Score – Assigns match strength and flags uncertain matches.**
* **Model Explanability : Category Prediction**
* **Streamlit**

**6. Frontend/UI**

* **Streamlit – Used for dashboard visualization in transaction matching.**
* **Custom UI – Developed using standard frontend tools to support user interaction.**