Effective Smart Contracts for Supply Chain Contracts

Bajeela Aejas
PhD Student
Dept. of Computer Science and Engineering
Qatar University

Abdelaziz Bouras
Supervisor
Dept. of Computer Science and Engineering
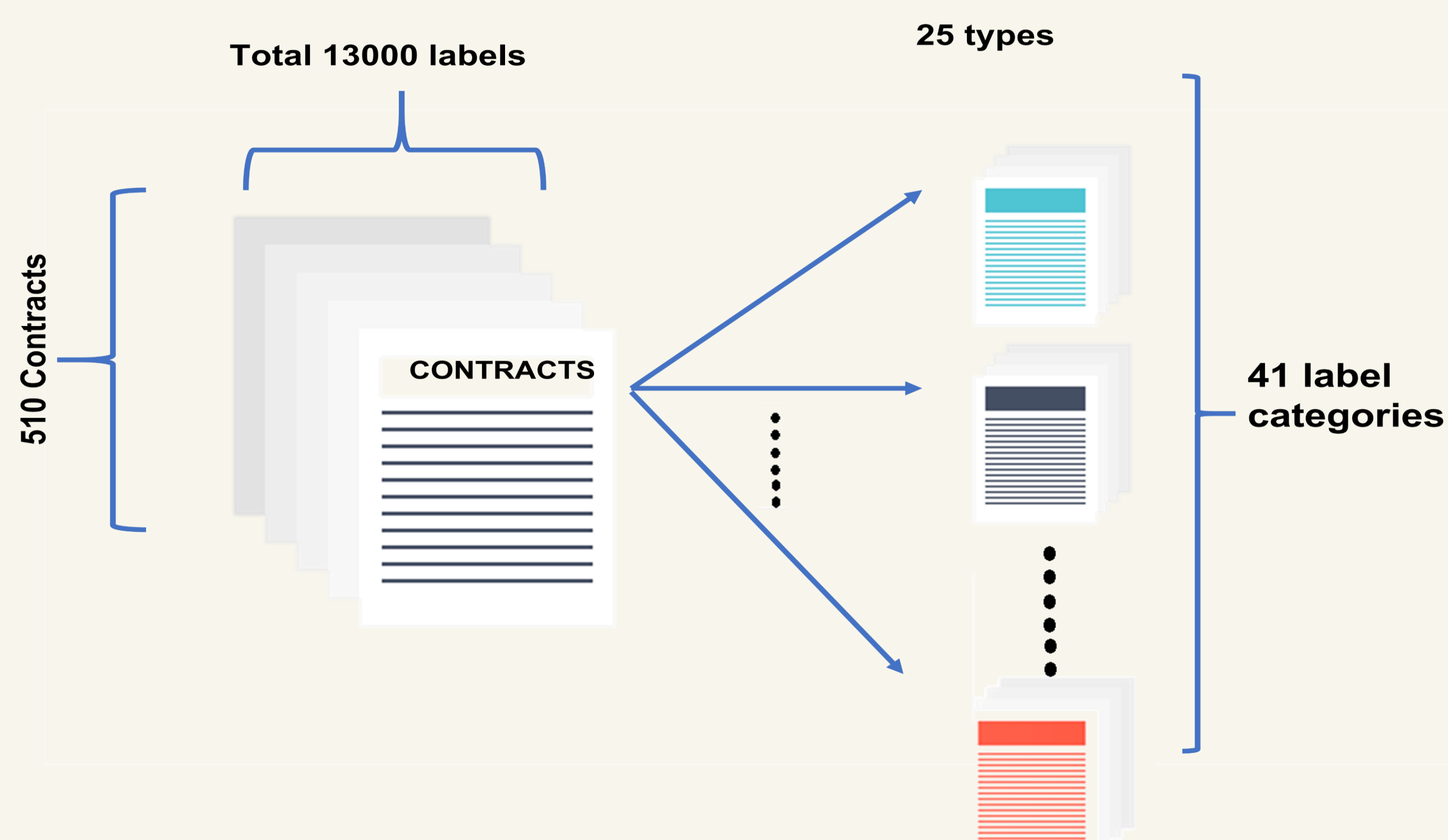Qatar University

INTRODUCTION

- Blockchain is in its way of revolutionizing different sectors with its decentralized peer-to-peer networking.
- Smart contracts are the piece of software that has written rules to be executed automatically to update the state of the block chain in a systematic way. One of the main use of Smart contract is in supply chain management.

- Supply chain management deals with lot of legal contracts at a time.
- Contracts are agreements between two or more parties that define the duties and obligations for execution of any kind of activities.

In this research we are trying to automate the supply chain related contracts by identifying the important entities such as contract type, start date, end date etc by using Natural Language Processing methods. Then convert the contract to smart contract. This provides an efficient template for creation of smart contracts from natural language contracts and there by offer best smart contract template for given type of contract in supply chain.

DATASET

Total 13000 labels
25 types
510 Contracts
CONTRACTS
41 label categories

- The dataset we are using is an annotated dataset named Contract Understanding Atticus Dataset (CUAD) contains various legal agreements from the Electronic Data Gathering, Analysis, and Retrieval System (EDGAR) by the US Securities and Exchange Commission (SEC).

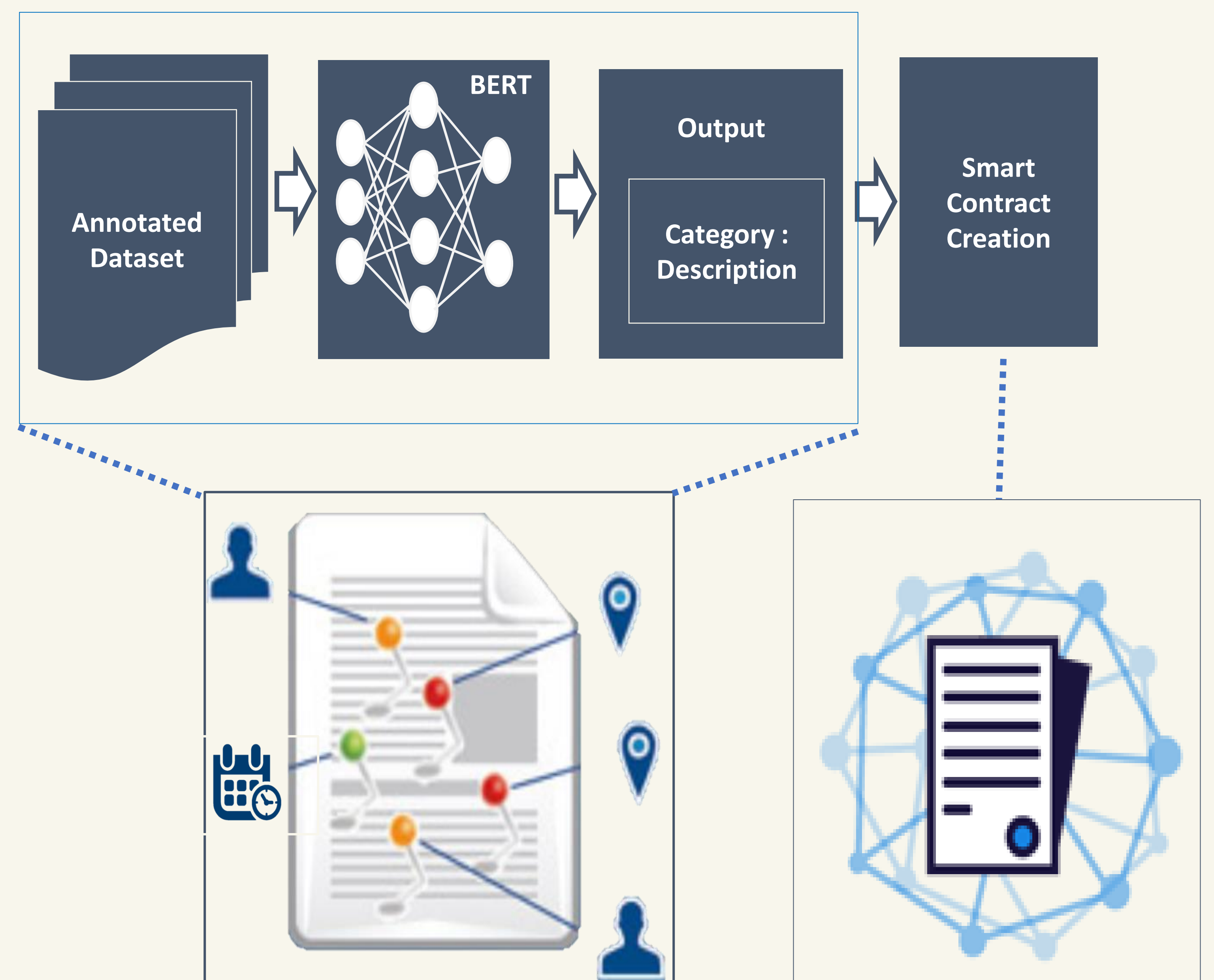| Some of the categories in the dataset and their descriptions	
Category	**Description**
Document Name	The name of the contract
Parties	The two or more parties who signed the contract
Agreement Date	The date of the contract
Effective Date	On what date is the contract being effective?
Expiration Date	On what date will the contract's initial term expire?
Renewal Term	What is the renewal term after the initial term expires?
Notice to Terminate Renewal	What is the notice period required to terminate renewal?

SYSTEM DESIGN

Contract Element Extraction
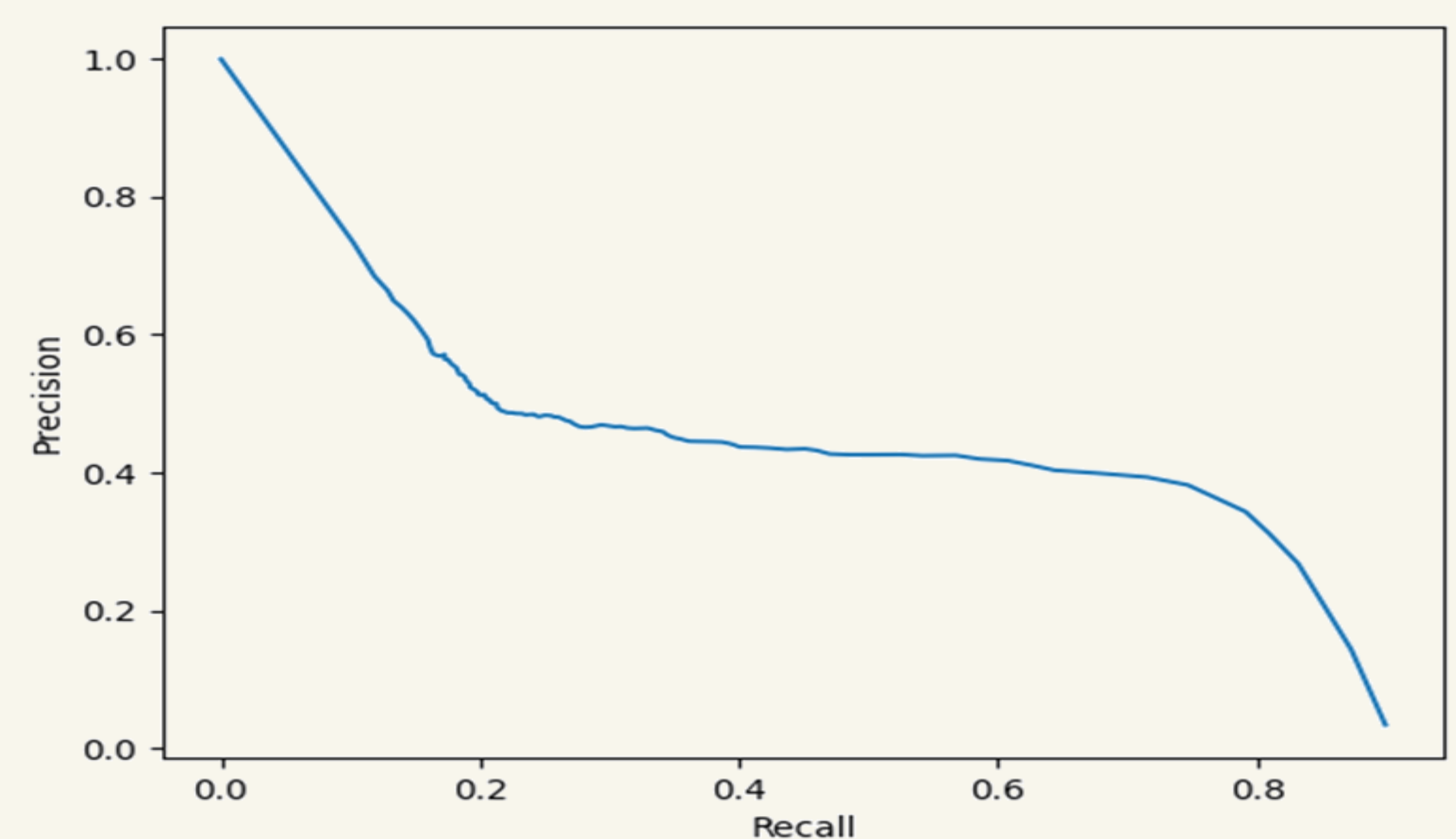

Annotated Dataset → BERT → Output / Category : Description → Smart Contract Creation

- The contract element extraction task is the prediction of which substrings of a contract relate to each label category.
- We finetuned BERT model using HuggingFace Transformers library's Question Answering model on the dataset.

Precision-Recall Curve

- The model learns the start and end token positions of the substring of each segment that is highlighted
- We need to implement smart contract based on the retrieved entities from the contract

REFERENCES

[1] Aejas B., Bouras A., Belhi A., Gasmi H. (2021) Named Entity Recognition for Cultural Heritage Preservation. In: Data Analytics for Cultural Heritage. Springer, Cham. https://doi.org/10.1007/978-3-030-66777-1_11

[2] Aejas B., Bouras A., Belhi A., Gasmi H. (2021) A Review of Contract Entity Extraction. 6th International Congress on Information and Communication Technology ICICT 2021.

[3] Hendrycks, Dan & Burns, Collin & Chen, Anya & Ball, Spencer. (2021). CUAD: An Expert-Annotated NLP Dataset for Legal Contract Review.

[4] Pranav Rajpurkar, Robin Jia, and Percy Liang. (2018). Know what you don't know: Unanswerable questions for squad. ArXiv, abs/1806.03822.

ACKNOWLEDGEMENT