# Artificial Intelligence (AI) Assisted Contract Creation

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**Abstract -** *Contract is a legally binding agreement between the two parties. In insurance, contract is a quintessential vehicle for every policy sold under which one party (the Insurer) accepts risk from another party (the Policyholder). Insurance contracts have multiple versions and are often very long due to various state and regulatory requirements. Also, Insurers frequently launch new products or modify their existing products to reduce their losses and respond to the changing market trends thus needing new contracts to be created. Most contracts are created by capturing the insurance applicant's information using an e-Application and populating contract shell PDF using a field level mapping logic derived manually. This mapping logic needs to be manually maintained and redone if the contracts change. Using Artificial Intelligence (AI) assisted contract creation solution, the mapping logic can be cognitively generated and maintained. This paper covers the various steps to build, train, and deploy the model along with its inherent benefits and advantages.*

***Key Words***:  Contract Management, Contract Generation, Intelligent Automation, Artificial Intelligence, Machine Learning, Insurance.

## 1.INTRODUCTION

Insurance Companies underwrite several types of products e.g., Simple Term Insurance, Whole Life Insurance, Universal Life Insurances, Annuity Contracts. In addition to the primary insurance product, the person or entity buying the insurance policy has the option to purchase additional benefits (commonly known in the industry as Riders) like Child Term Insurance, Accidental Benefit Rider, Long Term Care Rider, etc. These products and benefits are sold in the form of insurance contracts between the Insurer (the Insurance Company) and the Policyholder (person or entity that will be the insured or is the beneficiary). An insurance contract [1] is a contract under which one party (the Insurer) accepts significant insurance risk from another party (the Policyholder) by agreeing to compensate the policyholder if a specified uncertain future event (the insured event) adversely affects the policyholder. Traditionally, generating these policy contracts is a highly manual and laborious process. Constantly changing regulatory requirements, evolving underwriting guidelines, and modifying insurance product specification due to actuarial studies further prompt the need for regular updates and changes to the insurance contracts. By leveraging Artificial Intelligence (AI), insurance contracts can be generated and maintained seamlessly.

## 2. Background

The insurance application process is being digitized and supported by the latest web 2.0 technologies. The User

Interface (UI) acts are the source to gather the details necessary for quoting, rating, and underwriting the insurance policy. Once underwritten, if the intended policy holder agrees to the final rates and quote, the policy contract needs to be bound. During the binding process, the data elements captured on the User Interface needs to be mapped to the fields in the policy contract shell PDFs. This mapping exercise is manual and laborious.
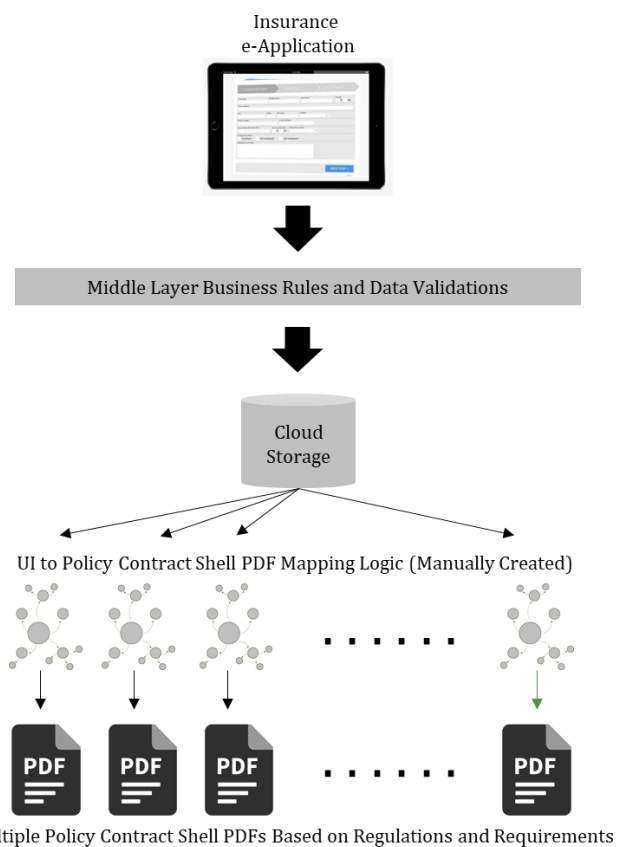


**Fig -1:** Manual Policy Contract Creation
(Current State)

Once the User Interface is mapped to the policy contract shell PDF fields, the mapping logic can be used repetitively for creating new policy contracts however, due to constantly changing state and industry regulations, revised underwriting rules and guidelines, and roll out of new insurance products as a result of actuarial studies require constant changes to the insurance application, the corresponding User Interface (UI), and the policy contract shell PDFs. This prompts the need for the User Interface (UI) to be re-mapped to the fields in the new policy contract shell PDFs.

Leveraging Artificial Intelligence, model is created and trained to cognitively create a User Interface (UI) to policy

contract shell PDF mapping [2]. This mapping drives the logic for final policy contract creation.
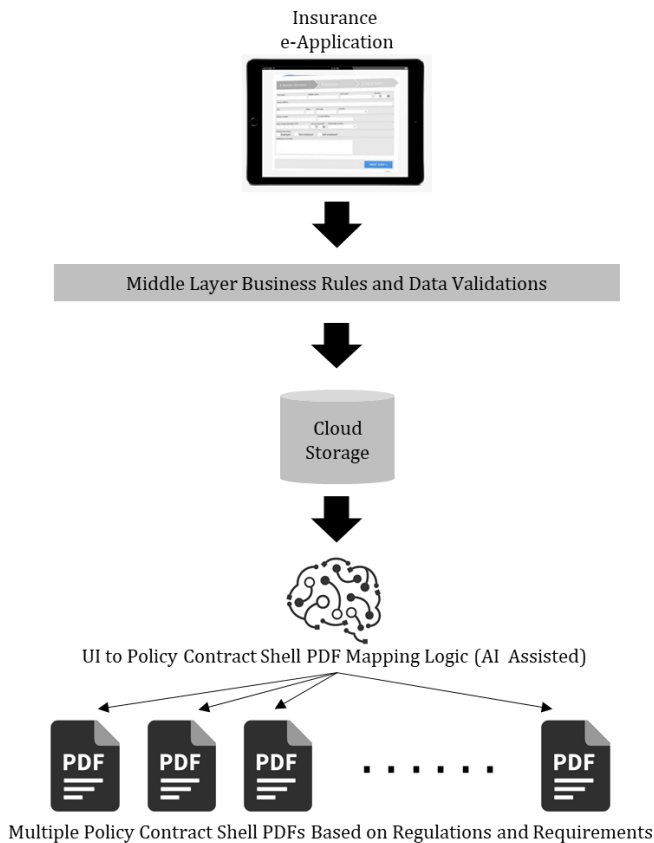


**Fig -2:** AI Assisted Policy Contract Creation (Target State)

## 3. Approach and Methodology Using AI

The approach for designing and developing the Artificial Intelligence model for assisted policy contract creation is based on below 4 key steps:

Step 1:   Analyze the policy contract shell PDFs to identify, classify, and tag the PDF fields that need to be populated.

- Ingest the policy contract PDFs shells.
- Train the AI model to analyze and classify the fields in the PDF shells using Character Recognition, Text Classification, and Text Similarity. [3]
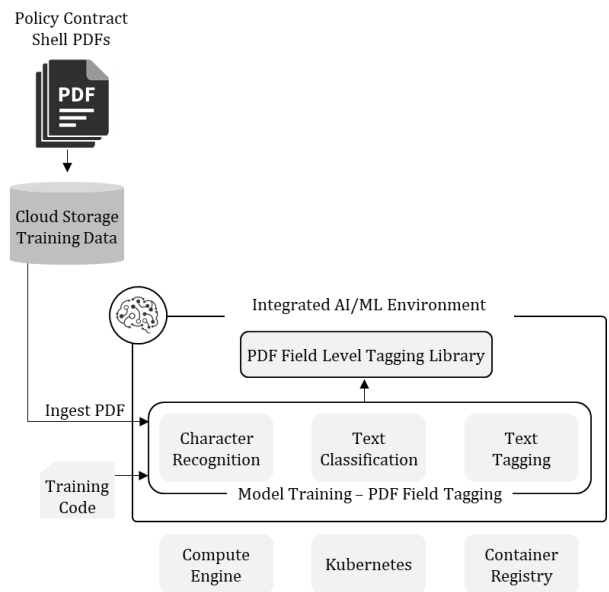- Store the analysis and PDF field level tagging in a library.



**Fig -3:** PDF Field Level Tagging Library

Step 2:   Prepare training data set using User Interface (UI) fields from the insurance policy application that needs to be mapped to the policy contract shell PDFs.

- Ingest the User Interface (UI) data elements from an extract file in JSON, XML, or CSV format.
- Layer in additional meta-data to the User Interface (UI) data elements (e.g., Field lengths, Field types).
- Prepare the master data set that is ready to be mapped to the policy contract shell PDFs.

Step 3:   Train the model to intelligently define the mapping logic between fields in policy contract shell PDFs (from Step 1) to insurance application User Interface (UI) fields (from Step 2).

- Using fuzzy logic [4], the algorithm matches the fields in the policy contract shell PDFs to the User Interface (UI) data elements from training data set to populate the PDFs. e.g., First Name on UI mapped to Insured First Name in policy contract shell PDF.
- Layer in additional reasoning using rules-based inferences, probabilistic inferences, and data element clustering for identifying similar fields.
- Determine the confidence score for the derived mapping logic and provide an audit log for supervised assistance and training model correction.
- Evaluate the model for its accuracy across key performance indicators like sensitivity and specificity for determining model efficiency and fine tune model as necessary until the evaluation of the model is satisfactory.
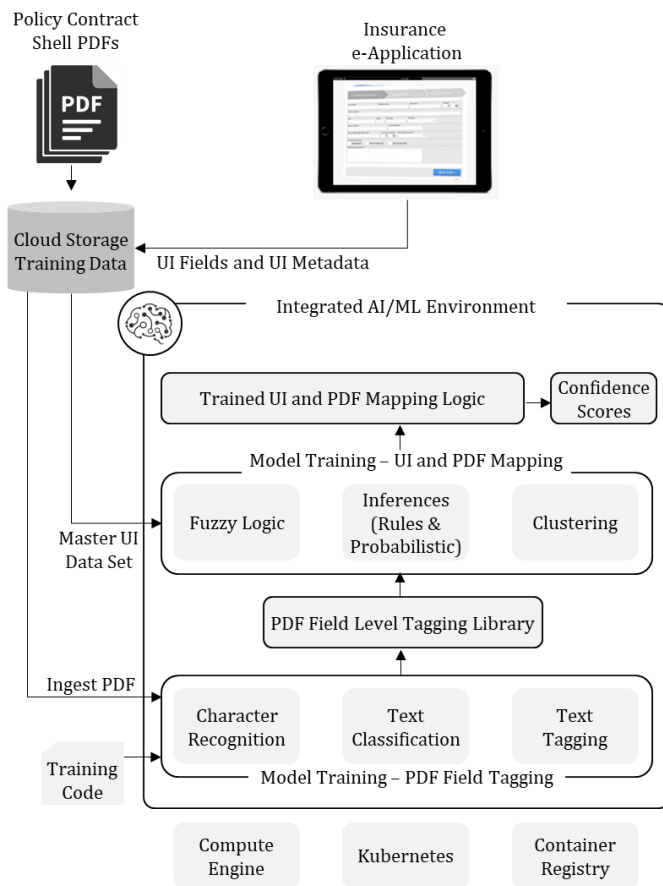
**Fig -4:** Trained UI and PDF Mapping Logic

Step 4: Host and deploy the trained model for User Interface (UI) and policy contract shell PDF Mapping.

- Once the model is fine-tuned and ready for production, it is deployed as show in Fig -2 i.e., AI Assisted Policy Contract Creation (Target State).

- Post production, the model is further iterated by leveraging Supervised Learning and Unsupervised Learning so that it can support any changes to the insurance application User Interface (UI) and/or changes to the policy contract shell PDFs so that the AI assisted User Interface (UI) and PDF Mapping logic is self-adaptive and stays relevant.

## 4. Benefits of Leveraging AI for Insurance Contract Creation

Benefit 1 – AI automates with high efficiency and accuracy:

- Artificial Intelligence (AI) assisted insurance policy contract creation solution automates the highly manual process needed to define the mapping logic between the User Interface (UI) fields of an insurance application to the policy contract shell PDF fields.

- While the initial Artificial Intelligence (AI) model setup and training can take few weeks, the creation of Artificial Intelligence (AI) assisted User Interface (UI) to policy contract shell PDF mapping logic can

be in minutes compared to the significantly longer time needed to achieve similar results and accuracy, if performed manually.

Benefit 2 – AI gives scale and speed to launch new products:

- Artificial Intelligence (AI) based solution addresses the common industry pain point i.e.; all insurers need to perform the mapping of insurance application User Interface (UI) fields to the policy contract shell PDF fields.

- The solution can operate at scale across multiple insurance products allowing swift response to contract changes for launching new products.

## 5. CONCLUSIONS

The Artificial Intelligence (AI) assisted insurance policy contract creation is a practical solution for navigating through the insurance industry wide problem of creating and updating the underline logic for mapping the insurance application User Interface (UI) to the policy contract shell PDFs. Given that the mapping logic can change due to several factors discussed above, Artificial Intelligence (AI) allows to respond with speed and agility. In addition, the solution will also enable operational scale by being able to be deployed on several insurance product types simultaneously.

## REFERENCES

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