

**Data Science
Webinar
Date: 23rd March 2024**

AI in Insurance



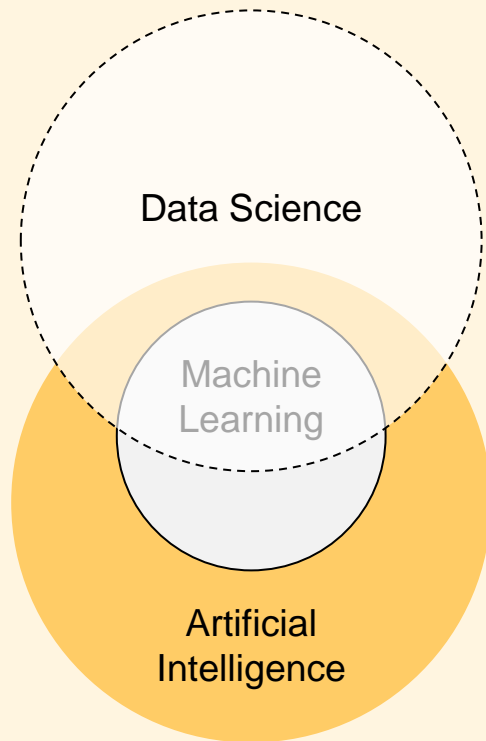
Institute of Actuaries of India

Agenda

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2	Milestones
3	Examples of AI
4	What AI can Do
5	How AI Works
6	Computational Thinking
7	AI Lifecycle
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10	Use Case of AI Insurance Fields <ul style="list-style-type: none">○ <i>ML for Insurance Fraud Detection</i>○ <i>Gen-AI for Processing Claims & Policy Documents</i>
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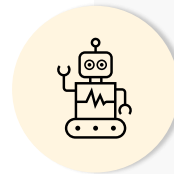
Data Science, AI & ML



Data Science : Collecting analyzing and interpreting data. It is used for informed decision making

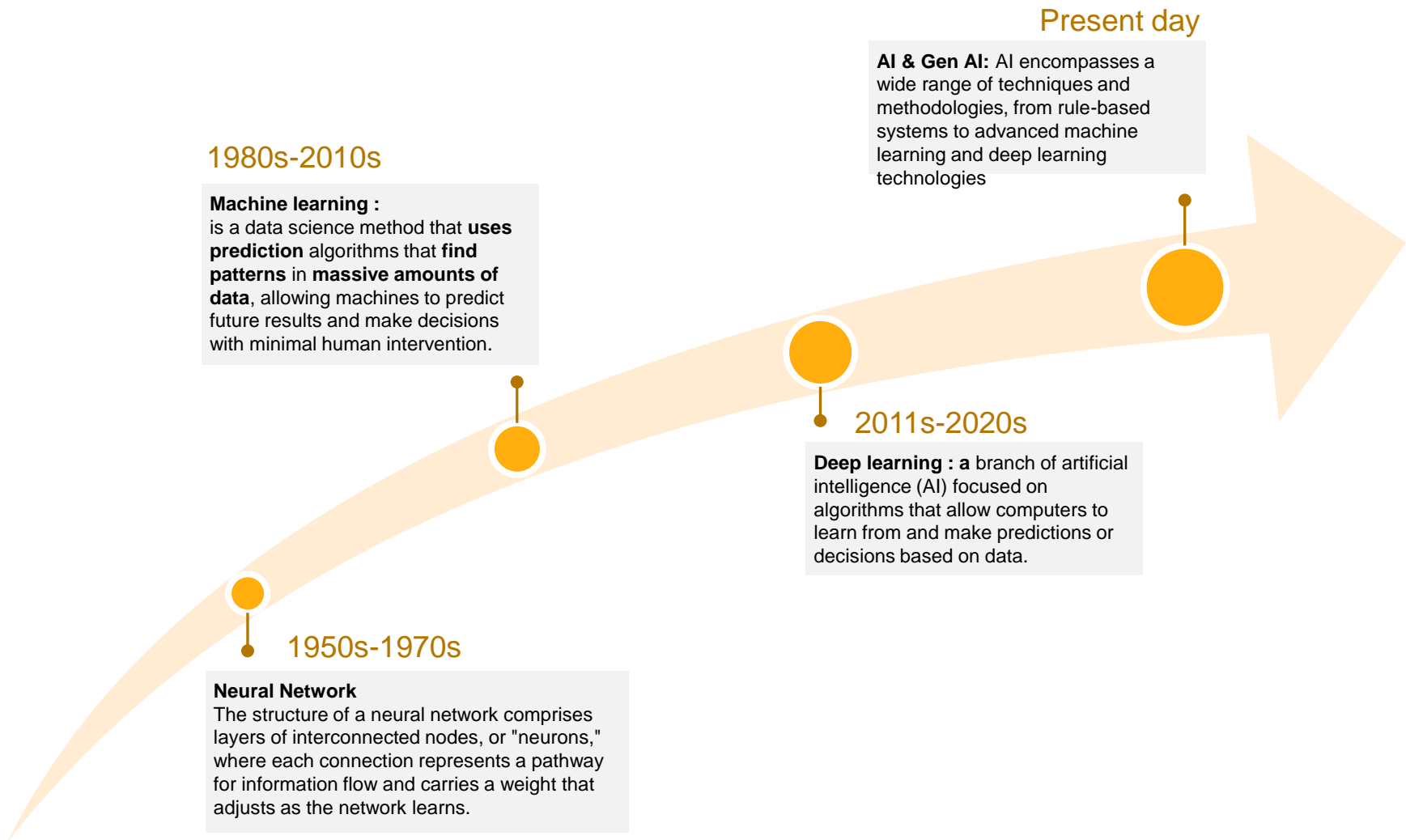


Machine learning – Algorithm that enables system learn from the data. It is used to optimize operations



Artificial Intelligence : simulate human-like intelligence

Milestones



1980s-2010s

Machine learning : is a data science method that **uses prediction** algorithms that **find patterns** in **massive amounts of data**, allowing machines to predict future results and make decisions with minimal human intervention.

1950s-1970s

Neural Network

The structure of a neural network comprises layers of interconnected nodes, or "neurons," where each connection represents a pathway for information flow and carries a weight that adjusts as the network learns.

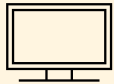
2011s-2020s

Deep learning : a branch of artificial intelligence (AI) focused on algorithms that allow computers to learn from and make predictions or decisions based on data.

Present day

AI & Gen AI: AI encompasses a wide range of techniques and methodologies, from rule-based systems to advanced machine learning and deep learning technologies

Examples of AI



Recommendation systems



Search engines



Voice assistant

Why AI is Gaining Popularity ?

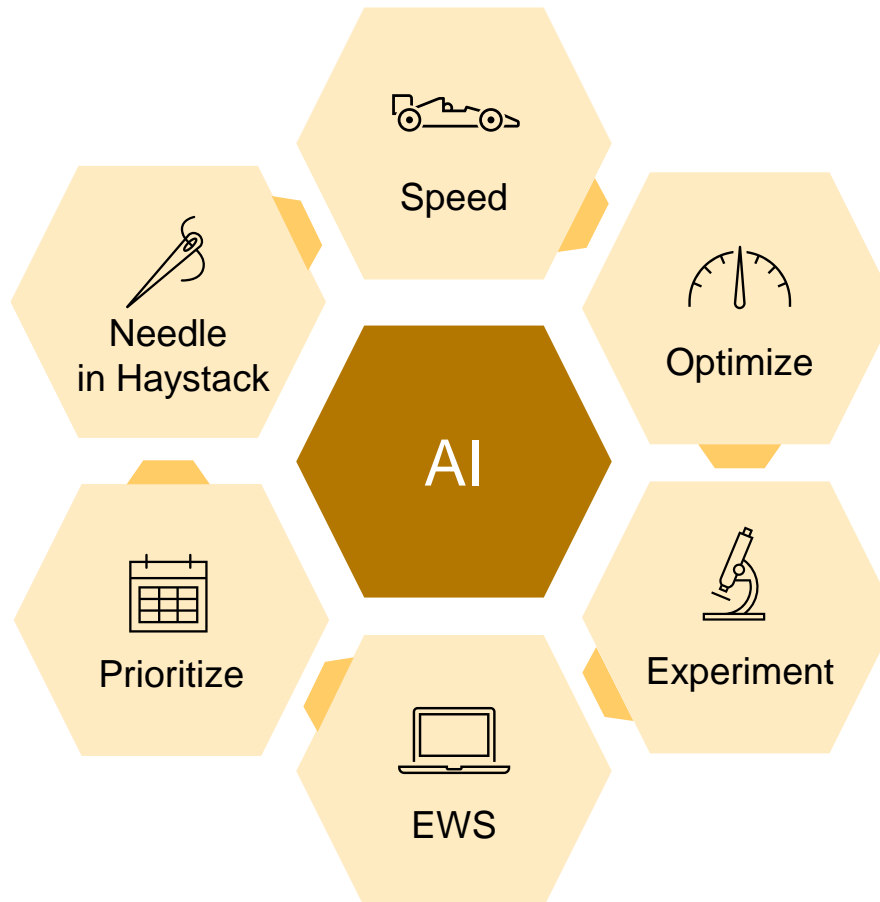
Data Quality

Advanced Algorithm

Computing Power

Storage

What AI can Do



How AI works

Large Amount of Data

Any type of data

Structured, Semi, Quasi and unstructured

Intelligent Algorithms

AI Tools

Different tools different offerings and have some overlaps

- **Python** – programming language , open source, used to clean visualize data
- **R** is similar to Python

Auto Learning

AI technologies

- **API**
- **GPU:**
- **Cloud computing:**

Computational Thinking

There are four main components to computational thinking



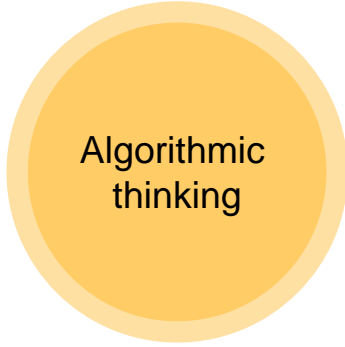
Decomposition



Pattern
Recognition

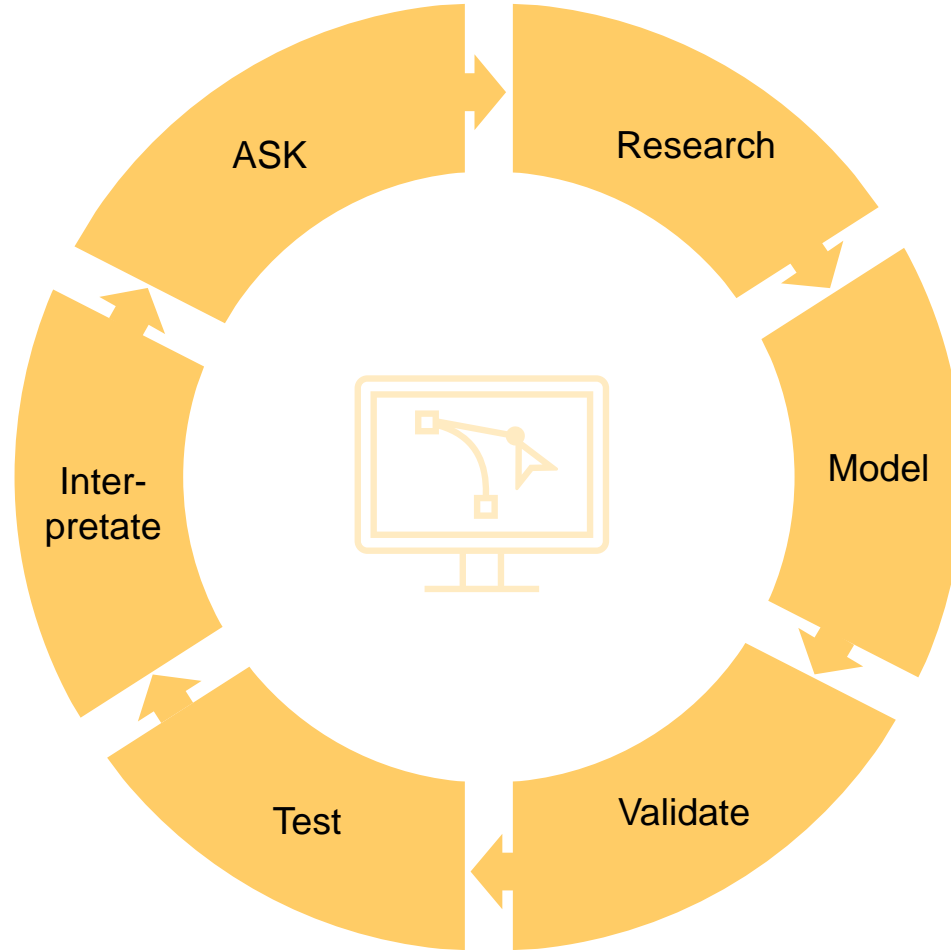


Abstraction



Algorithmic
thinking

AI Lifecycle



AI vs. Traditional Programming

Traditional Programming

- Rigid rule-based depend on programmers
- Struggle to adapt with changing data
- Inefficient with complex unstructured data like videos etc.
- Extensive code revision
- Debug challenging

AI

- No explicit programming
- Adaptable and flexible for changing and complex data sets
- Easy to maintain
- Scalable

AI in Insurance : Experimentation to Implementation

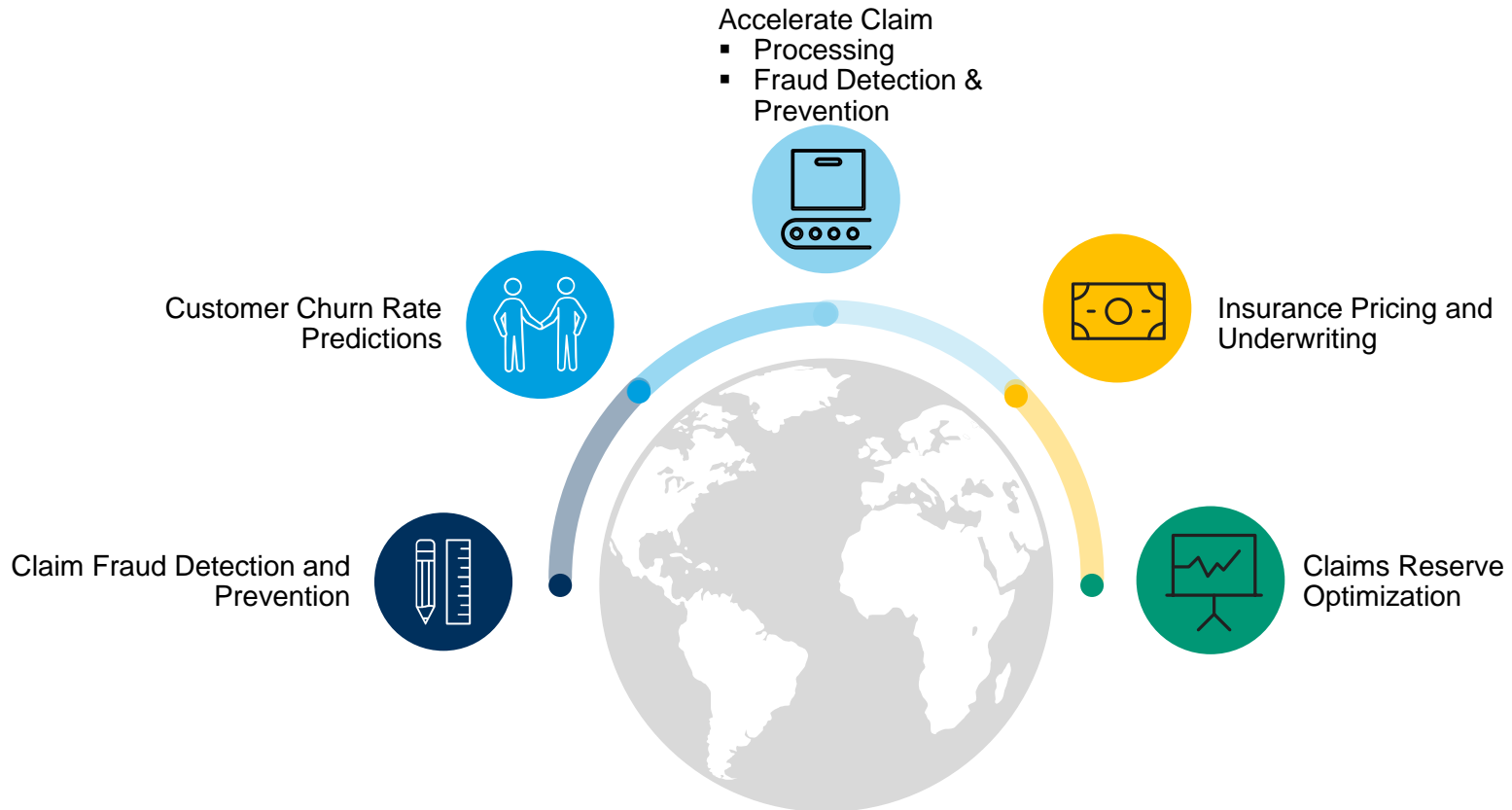
PRODUCT

- **Health Insurance** – discounts using the scores of Fitapps, reminders for an important healthy routine
- **General Insurance:** help insurers that use in-vehicle telematics and that offer usage-based insurance (UBI) to gain greater insight into the data collected from policyholders. This enables them to provide customized insurance and anticipate customer needs while providing personalized services.
- Emerging and new risk management

OPERATIONS

- UW
- Claims
- Customer support
- Prioritize
- Customer Retention
- Reporting
- Data Collection and Analytics

Top Use-Cases of AI in Insurance Industry



Case Study 1 of AI for Insurance Fraud Detection

Develop ML model to detect Insurance Fraud by analysing data of past claim and policy holder and predict the likelihood of a claim being fraudulent. Helping in identifying and investigating claim before they are paid out loss or damage.

Data

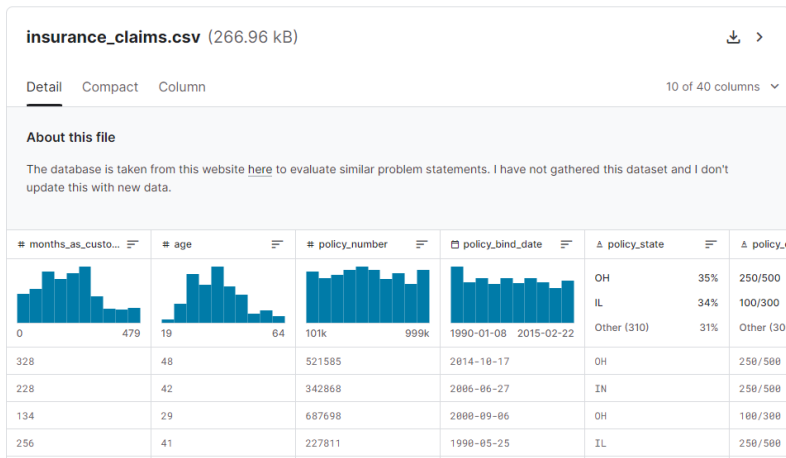
For non-industry practitioners to get hand on to real world data for modelling prefer Kaggle / Google Dataset

Insurance Fraud Claims Detection

Python · Auto Insurance Claims Data

Notebook Input Output Logs Comments (6)

Input Data



Source: <https://www.kaggle.com/code/buntyshah/insurance-fraud-claims-detection/input>

Feature Engineering

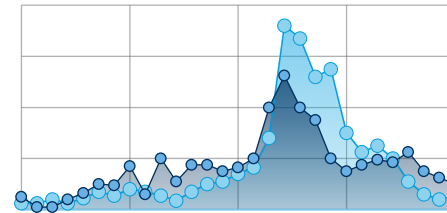
Data Cleaning



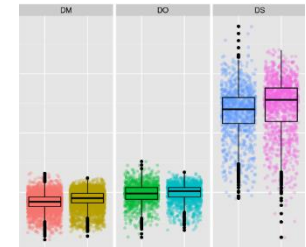
Variable Exploration



Studying Distribution



Outlier Analysis



Variables Standardizing / Scaling



Case Study 1 of AI for Insurance Fraud Detection

Model Development

Identify given the data and problem statement whether it can be solved using Classification or Regression based method?



Split Data into Train and Test subset

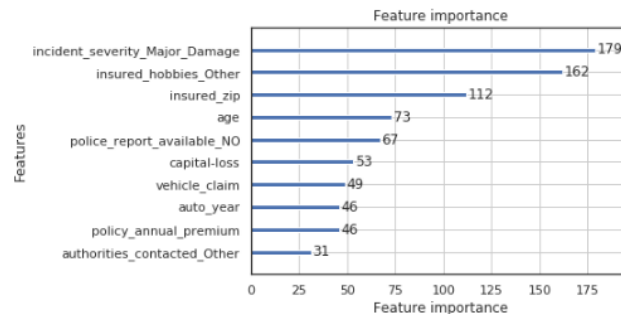
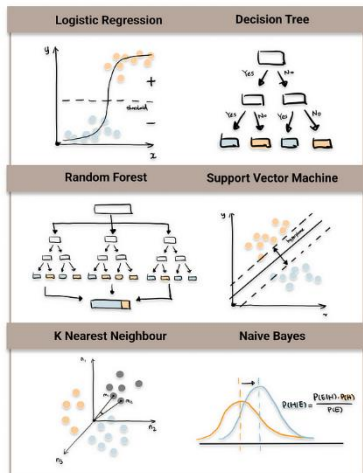


Use Training data subset to develop the model

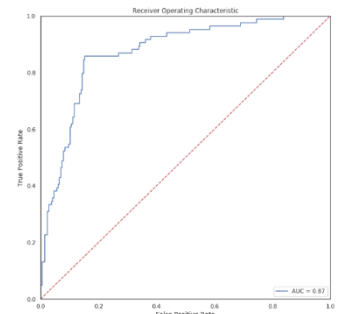
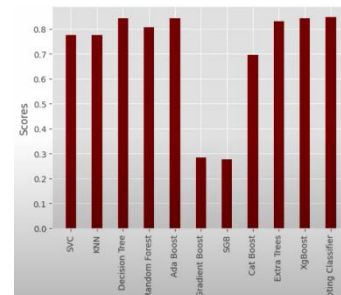


Model fine-tuning and hyper-tuning

Model and Variables Selection

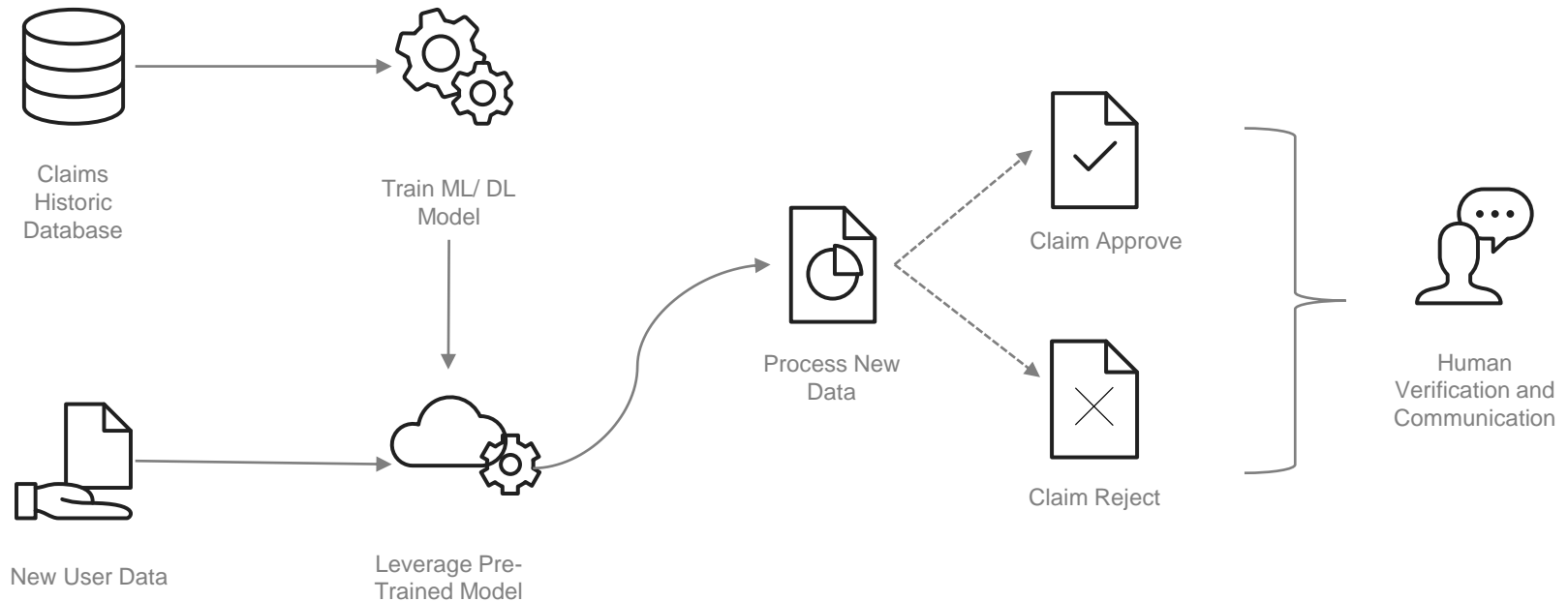


Prediction → Calibration → Validation

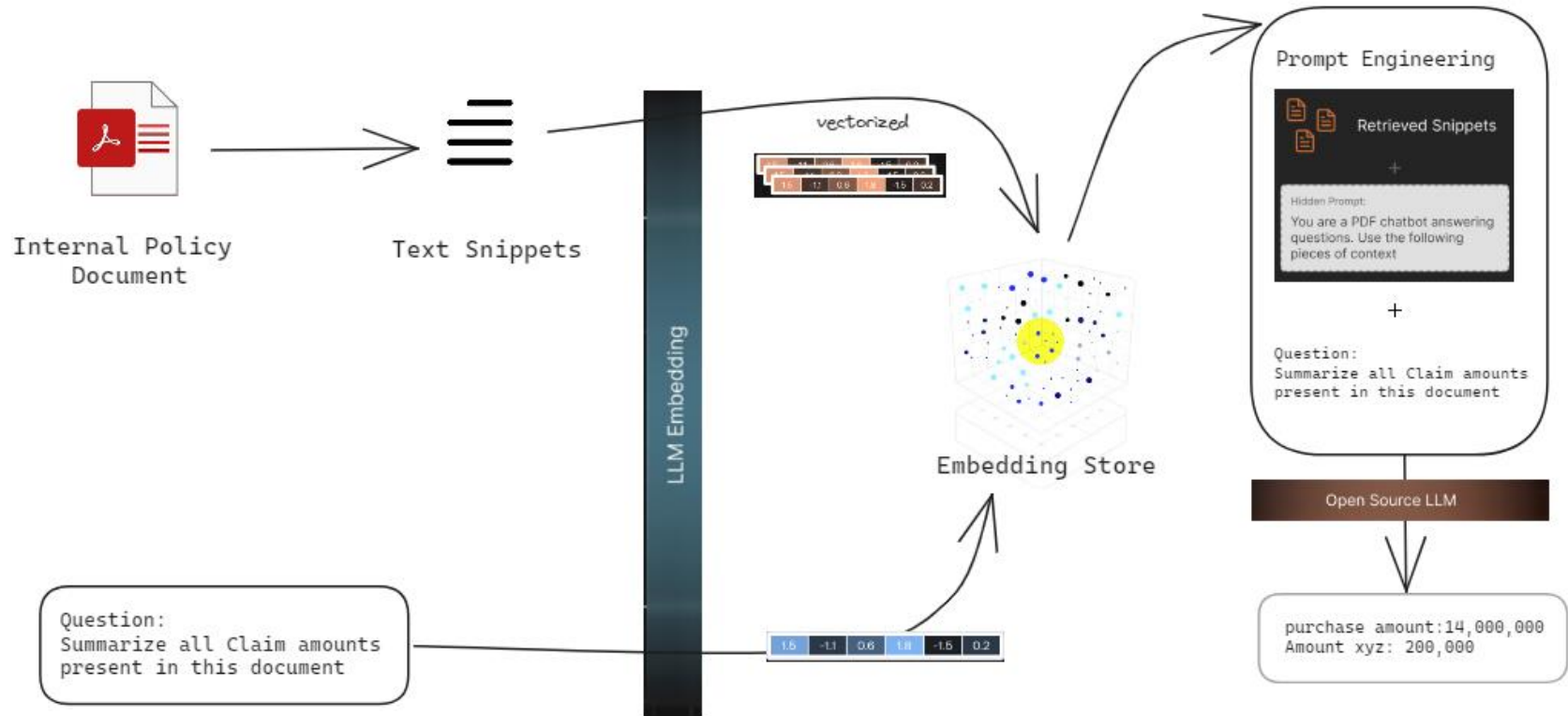


Case Study 1 of AI for Insurance Fraud Detection

Model Deployment and Work at Production



Case Study 2 of Gen-AI for Processing Policy & Claims Documents



Live App Demo: [Hugging Face App Demo Doc QA](#)

Deep Understanding: Combines generative models and specific document data for precise interpretation of policy and claims documents.

Quick Information Retrieval: Speeds up document processing by efficiently finding relevant information.

Process Enhancement: Automates routine tasks and reduces manual effort, leading to more efficient and streamlined operations.

Data Security and Privacy: Ensures the protection of sensitive information through localized, maintaining confidentiality and compliance.

Future of Insurance Industry using AI

Unprecedented growth of AI in Insurance field

■ **Affordability and Value of AI:**

- Costs to implement AI have significantly decreased.
- Example: Training costs for ResNet-50 on a cloud platform fell from around \$1,000 to \$10 from 2017 to 2019.
- AI investments provide benefits across insurance functions, enhancing the entire value chain, such as in claims processing, policy servicing, and customer contact areas.

■ **Investment in AI Is Accretive to Market and Investor Confidence:**

Industry recognition of AI's transformative potential is growing among investors.

Insur-techs, leveraging AI, machine learning, and language processing, have seen a Compound Annual Growth Rate (CAGR) of 20% in investments from 2015 to 2020.

In 2021, there were at least five instances where VC funding exceeded \$100 million for AI-led insur-techs.

This substantial funding underscores the confidence in AI to enhance market and investor sentiments through strategic investments.



Future of Insurance Industry using AI



Source: BCG analysis and experience.

Note: FNOL = first notice of loss.

Source : <https://www.bcg.com/publications/2023/the-future-of-insurance-claims>

AI Related Suggestions and Resources

Frequently used algorithms

While the algorithm that we use for depends predominantly on the input dataset and problem statement. In general following algorithms are widely used:

- Predictions of customers churn → ANN, XGBoost, Random Forest
- Claims Processing and Management → NLP, Transformer
- Personalized Recommendation → Boltzman Machine
- Fraud Detection → Isolation Forest for Anomaly Detection
- Telematics and Usage-Based Insurance → Long Short-Term Memory (LSTM) Networks for Time Series Forecasting

Keeping-up with face paced AI field



Papers with Code

Link: www.paperswithcode.com



Hugging Face

Link: <https://huggingface.co/>



Kaggle

Link: www.kaggle.com/



Open Router

Link: <https://openrouter.ai>



Replicate AI

Link: <https://replicate.com>

Challenges of AI



Ethical considerations



High dimensional data



Cost



Complex

Thank You

