

# Machine Learning and Generative AI

Exploring Real-World Applications

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# Data Science & Machine Learning Overview



## Predictive Models

Data Science and Machine Learning utilize predictive models to analyze trends and forecast future outcomes based on historical data patterns.



## Generative AI

Recent advances in Generative AI enable automated content creation and intelligent decision-making, revolutionizing various industries and applications.

# Pharma & Healthcare Applications

01



## Drug Discovery

Problem: Drug discovery & patient treatment personalization are time-consuming and costly. Traditional clinical trials delay innovations.

02



## Machine Learning

Solution: Machine learning shortens drug development by analyzing mutation profiles, patient history, and treatment metadata. AI-driven imaging systems support early diagnosis.

03



## Estimated Value

Results: Estimated \$100B annual value created from improved decisions, research efficiency, and clinical outcomes in pharma and healthcare.

# FMCG & Retail Use Cases



## Recommendation Engines

Amazon's personalized product suggestions drive sales growth using collaborative filtering and classification techniques to enhance user experience.



## Demand Forecasting

Facebook applies machine learning for sales and inventory predictions, enhancing operational efficiency and ensuring product availability at all times.

# Banking & Insurance Insights



## Fraud Detection

ML models identify anomalies in transactions, reducing financial fraud.



## Risk Modeling

Regression and classification algorithms assess credit risk and customer profiles.



## Customer Analytics

Predictive analytics enhance customer retention and cross-selling strategies.



## Insurance Claims

Automated claim processing with image recognition and NLP expedites approvals.

# Transport & Route Optimization

The evolution of transport and route optimization has been significantly influenced by machine learning and predictive analytics. Starting in 2015, Uber implemented ML to enhance route efficiency, followed by advancements in autonomous vehicle technology, dynamic pricing strategies, and traffic forecasting, aiming to improve user experience and reduce operational costs.



## 2015: Route Optimization

2015: Uber implements ML for route optimization, reducing wait times and fuel consumption



## 2018: Sensor Data

2018: Autonomous vehicle development incorporates real-time sensor data analysis



## 2021: Dynamic Pricing

2021: Machine learning enhances dynamic pricing based on demand and conditions



## 2024: Predictive Analytics

2024: Predictive analytics forecast traffic and availability for better ride experience

# Key Machine Learning Techniques Across Sectors

Machine learning techniques play a vital role across various sectors, helping to validate assumptions, predict outcomes, enhance efficiency, forecast trends, efficiency, forecast trends, and automate decision-making. Each stage contributes significantly to the development and implementation of robust models. of robust models.



# Amazon Example

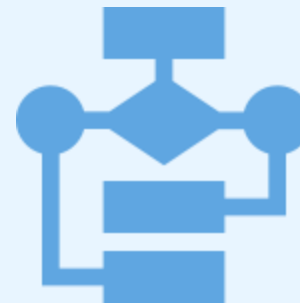
01



## Problem

Customers overwhelmed by product choices, leading to lower conversion rates. This affects overall sales and customer satisfaction significantly.

02



## Solution

Collaborative filtering algorithms analyze purchase history and browsing to recommend relevant items, enhancing the shopping experience for customers.

03



## Results

35% of Amazon's revenue is driven by their recommendation system, significantly boosting customer engagement and sales through effective suggestions.



# Google PageRank & AI



## Graph Theory

Developed by Larry Page and Sergey Brin, Brin, PageRank uses graph theory and link analysis to rank webpages by importance.



## Machine Learning

Applied machine learning to improve search relevance, enhancing the accuracy and efficiency of results delivered to users.



## LLM Integration

LLM integration advances contextual understanding of queries, greatly enhancing the user experience through better results.

# Netflix & Facebook Use of AI



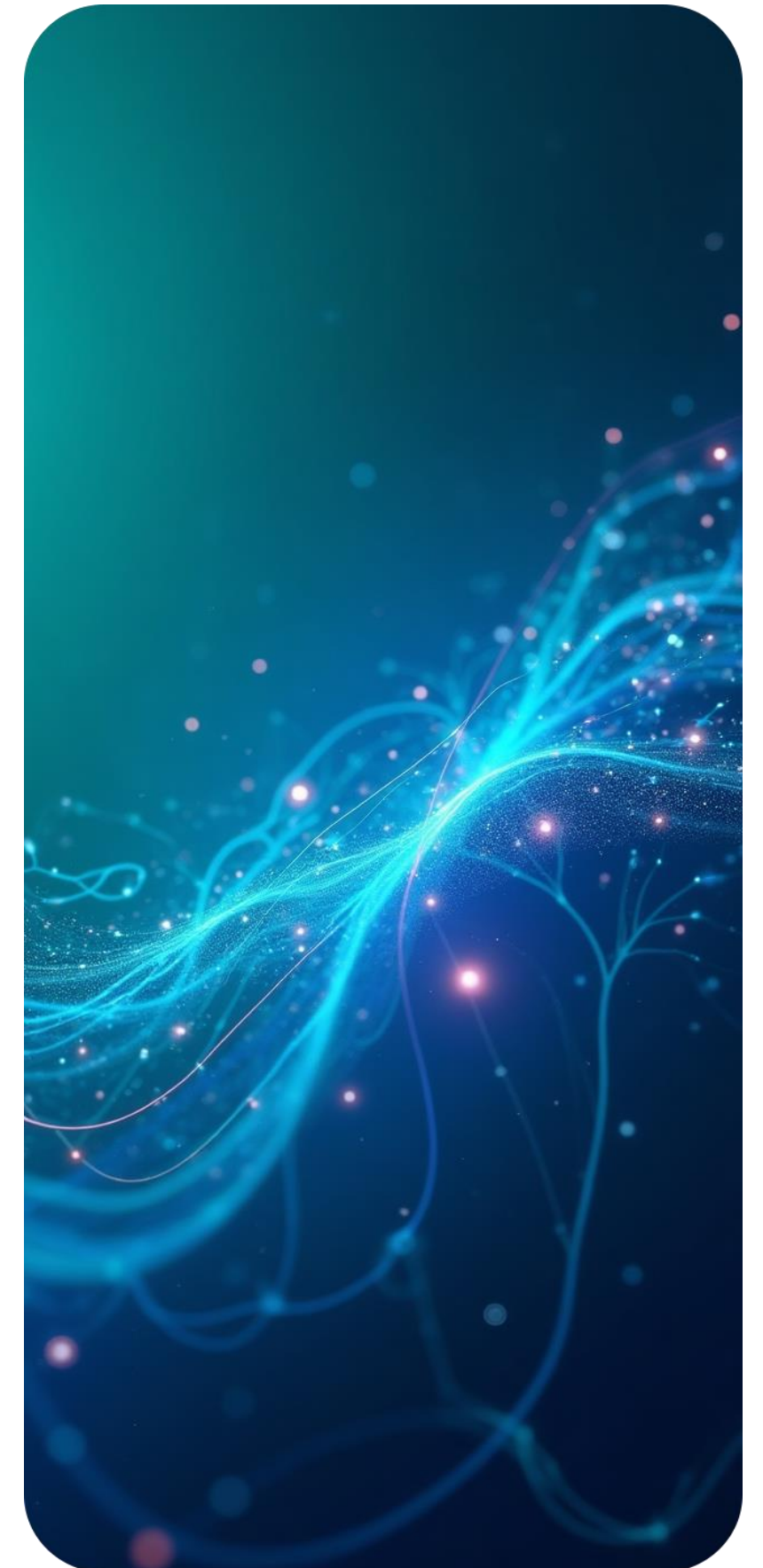
## Netflix AI Models

Netflix utilizes classification and time series models to predict user preferences and optimize content delivery schedules effectively.



## Facebook AI Tools

Facebook employs demand forecasting and image recognition models for targeted ads and personalized content curation, enhancing user experience.



# Generative AI & Image Applications

Generative AI creates new content such as text, images, and audio by learning patterns from vast datasets. Large Language Models (LLMs) support natural language understanding and generation, revolutionizing how we interact with technology and enhancing creativity across various fields.

## \*\*Image Recognition\*\*



Image Recognition



Synthetic Data  
Generation



Content Automation



Thank you.

Thank you for your time and attention!