

Name of the subject: Artificial Intelligence Applications {AIA}

R22 B.Tech. CSE (AI and ML) Syllabus

JNTU Hyderabad

AM722OE: AI APPLICATIONS (Open Elective – II)

B.Tech. IV Year I Sem.

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Prerequisites: Fundamentals of AI

Course Objectives:

- To give deep knowledge of AI and how AI can be applied in various fields to make life easy.

Course Outcomes:

- Correlate AI and solutions to modern problems.
- Use of AI in business applications
- Application of AI in manufacturing automation
- Use of AI in streaming of data and Network applications

UNIT - I

Alibaba: Using Artificial Intelligence To Power The Retail And Business-To-Business Services Of The Future

Amazon: Using Deep Learning To Drive Business Performance

UNIT - II

McDonald's: Using Robots And Artificial Intelligence To Automate Processes

Walmart: Using Artificial Intelligence To Keep Shelves Stacked And Customers Happy

B E C A U S E B A S I C I S B O R I N G .

UNIT - III

LinkedIn: Using Artificial Intelligence To Solve The Skills Crisis

Netflix: Using Artificial Intelligence To Give Us A Better TV Experience

UNIT - IV

Salesforce: How Artificial Intelligence Helps Businesses Understand Their Customers

Uber: Using Artificial Intelligence To Do Everything

UNIT - V

Siemens: Using Artificial Intelligence And Analytics To Build The Internet Of Trains

Tesla: Using Artificial Intelligence To Build Intelligent Cars

TEXT BOOK:

1. Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Bernard Marr, Matt Ward, Wiley.

ALIBABA

founded: 1999 by Jack Ma

Headquarters: Hangzhou, China

core Business: E-commerce, digital payment, logistics, AI, cloud computing, entertainment.

Alibaba: Using AI to power the retail & Business -To-Business services of the future.

{Alibaba platforms}

Alibaba.com - global wholesale marketplace connecting suppliers & buyers.

Taobao - consumer-to-consumer (C2C) market place

Tmall - Business-to-Business (B2B) platform

Alipay - digital payment & financial service platform

Cainiao - logistics & supply chain platform

Aliyun - cloud computing & AI services

{Business highlights}

→ Hosts Singles Day (Nov 11), the largest online shopping event in world; predicting demand for products during sales.

→ International Expansion via Ali Express and lazada.

"AI in retail (B2C)"

- 1.) Personalized Shopping Experiences:
AI analyzer to recommend products on Tao bao and Tmall by observing users behavior.
- 2.) Visual search & voice assistance:
feature powered by AI and NLP.
- 3.) Dynamic pricing & promotions:
predicts demands & trends and blends in real time by using ML Algos.
- 4.) Fraud Prevention:
AI monitors transactions to detect suspicious activity in Alipay.

"AI in (B2B)"

- 1.) Alibaba.com & Ali Express:
AI matches suppliers with buyers more effectively
- 2.) Supply chain optimization:
Predictive analytics forecasts demand, manage inventory & optimizes logistics.
- 3.) Smart logistics:
Platforms like Cainiao. Uses AI driven robots & route optimization Algo to reduce delivery time & cost.
- 4.) Warehouse Automation:
Robots & AI streamline sorting, packaging and shipping services.

"WALMART"

founded: 1962 by Sam Walton

Headquarters: Bentonville, Arkansas, USA

Business: Retail giant hypermarkets, discount department stores, grocery stores.

Walmart: Using AI to keep shelves stocked and customers happy

uses of Tech & AI's

1.) Supply chain optimization:

AI predicts products, demands & trends.
Automated robots helps in restocking.

2.) Customer Experience:

Personalized recommendation feed through AI driven data.
chat bots and virtual assistants for customer support.

3.) Inventory Management & Shelf stocking:

Robots of automation to help the warehouses operations.
Autonomous delivery vehicles & drones are being explored.

4.) Fraud prevention & Security:

AI monitors transactions to detect unusual activity & scams.
Scanners and CCTV to keep the track of goods.

5.) Pricing and Promotions:

Dynamic pricing algo to adjust prices based on real time.
optimization of promotions using AI recommended trends.

Business highlights

- 1.) Global retail presence - operates the stores over 10,500 across 19 countries.
- 2.) Stores - services available both online and physical with millions of users.
- 3.) Revenue & Sales - one of the largest retailers in the world for revenue with diverse of scales.
- 4.) Growth areas - online shopping & physical stores with groceries, general merchandise, e-commerce and membership services.
- 5.) Customer experience - uses AI driven personalized feed and recommendation based on purchase history.
- 6.) Supply chain leadership - Advanced AI powered inventory management which controls robotics shelves of stock operations.
- 7.) Technology & Innovation - uses AI for pricing, self checkout, demand forecasting, fraud detection, customer insights.
- 8.) Sustainability & Corporate responsibility - Follows reduce energy, waste management and focus on ethical source & community support events & programs.

"AMAZON"

Founded: July 1994 by Jeff Bezos

Headquarters: Bellevue, Washington, USA

Business: the everything store, broadened beyond retail - i.e., entering cloud computing, digital streaming, devices, grocery, and much more.

Amazon: Using deep learning to drive business performances.

{Amazon Core }

- 1) E-commerce & market place warehouses - Amazon.com the online shopping market spot.
- 2) Cloud services - via AWS (Amazon web services) providing cloud infrastructure, storage.
- 3) Devices & hardware - products like e-readers (Kindle), alexa, smart devices, tablets etc.
- 4) Digital media & entertainment - streaming platforms like Amazon prime, amazon mint TV, etc. and Amazon pay to get the users of digital payment.
- 5) Physical retail/grocery - Through supply chains like Amazon retail warehouses, amazon fresh/Pantry/medico.

{Business Highlights}

→ Has 310 million active users world wide

→ 1,556,000 global employees.

→ US \$ 630 Billion of revenue

→ 50% of Amazon's income is from AWS.

→ It began as an online Bookstore.

"Key Areas where DL powers Business"

1) Personalized Recommendations & Search:

By AI analyzer which observes user's browsing history, purchase, clicks, cart, wishlist. Then ML models perform DL to the data & predict the product demands.

Shopping intent - the tracking & search of package for before & after the dispatch of order uses DL to report & get metrics in real time.

2.) Demand Forecasting & Inventory / Supply Chain Optimization:

ML analyses historic sales, seasonal effects, geographic demand to predict the products. This helps Amazon to maintain the inventory stocks.

Uses Amazon warehouses to operate the delivery routes, logistics, making it faster & cheap via AI analysis & robots.

3.) Search & Query correction / UX Improvement:

ML adapts the human errors, misspells & corrects them represents correct results.

AI tools like image vision, voice assistants makes users browsing easier.

4.) Fraud detection & Risk control:

Amazon runs on ML systems to scan & transfer money which detects frauds based on reviews/ behaviour patterns.

"McDONALD'S"

owned: 1940 by California Richard & Maurie McDonald
expanded by Ray Kroc

headquarters: California, USA (Founded place)
Chicago, USA (Updated place)

Business: Fast food / QSR (Quick Service Restaurant)

McDonald's: Using Robots and AI to automate process.

McDonald's menu

Sburgers (Big Mac, McChicken, MC veggie, etc)

classic fries

chicken Nuggets, bytes etc

Breakfast (Mc Muffins, hash browns)

Beverages (Mc cafe, shakes, Soda, ice-cream coke)

Business highlights

McD operates as hybrid model - provides both online + franchised restaurants (majority). It has 40,000 + restaurants over 100 countries, in which 90% stores are franchises and 10% are owned by them.

1.) Revenue & profit - Due to typed fast food and royal

customers it has \$23-24 billion of revenue and other profits from franchised model.

2.) Brand name & fame - world's most valuable brand in food industry. Provides regional flavour food (eg: India has Maharaja Mac). communities via McD House of charities.

"The Automation process"

1) AI-driven ordering system:

Self Service system and booking screens uses KASOSIS model. Named after its authors/creators Karl, Alois, Stanislav, Oldrich - self service info system.

To understand accents, slang, menu items. If uses it uses NLP. And AI to analyse the menu based on weather, time of the day, season, popular item, local trends, etc.

Eg: Hot day → promotes cold drinks.

Morning → promotes Mc Muffin & coffee.

2) Robotic Kitchen:

It uses vending machines for soft drinks, shakes.

Dispensers for mopping & trash bins.

Robots to cook the menu.

Customers get personalized feed based on their purchase and loyalty. It offers discounts, lucky membership. Like someday Mc chicken has discount.

Eg: The robot is named Bellabot introduced in 2021 by Chinese company by Didi Robotics. Expanded in UK, Poland, Netherlands.

"LINKEDIN"

Founded: 2002 & launched in 2003 by Reid Hoffman

Headquarters: Sunnyvale, California, USA

Mot: Business - employment - oriented social networking site.

LinkedIn: Using AI to solve the skills crisis

{ LinkedIn used for }

- creates a professional profile (like an online resume) that includes education, work experience, skills, achievements, etc.
- A company/organization page is for the user to describe like what you do, your mission vision, working, etc.

{ Business Highlights }

- 1.) It's widely recognized as the largest professional networking platform in the world.
- 2.) Under Microsoft, LinkedIn's growth accelerated and expanded globally.
- 3.) It's a platform that is not just limited to networking it's creates career & ecosystem.
- 4.) India is LinkedIn's 2nd largest user base after the US.
- 5.) Over 15 million jobs are listed and over 87% of recruiters use LinkedIn.

"AI to address skill gap"

1.) AI-powered job matching/ Hunt:

The "job match" feature in LinkedIn is powered by AI. It keeps the track of skill gaps i.e. the gap between what employers need vs what job seekers offer. AI uses the user profiles to analyse (skills, experience, certificates, education) and compare it to the job requirements. This finds the job seekers and matches.

2.) Skill gap detection & forecasting:

AI assesses where across the user's data skills and forecast to the requirements numbers. The gap is filled and data is stored in LinkedIn's learning platform called Lynda.com which was bought in 2015 for \$1.5B

3.) Personalized learning & upskilling:

for upskill it provides free courses and AI suggested platforms to upgrade. It even provides daily streak of learning questions and games. The feed is personalized based on the patterns matched.

4.) Easing Recruitment burden for companies:

Many firms/organizations struggle to find the desired employee, AI tech features make the task easy and gives fair chance to everyone by the help of filters, discover talent, skills, etc.

"Netflix"

founded: 1997 by Reed Hastings & Marc Randolph

headquarters: Los Gatos, California, USA

core: A global streaming service which provides movies, webseries, TV shows, kids content, Anime, etc.

Netflix: Using AI to give us a better TV experience

{ Business Platform }

1) Netflix offers Hollywood, Bollywood, regional-international movies, shows, and much more content.

2) It provides classic user experience through subscription tiers (prices vary by country) which give 4K quality and multiple device access.

3) The most best and popular feature is Ad-free viewing and download offline to watch without internet.

{ Highlights of Netflix }

→ One of the largest streaming platform in the world.

→ over 260+ million subscribers globally; available in 190+ countries

→ Started as DVD-by-mail a rental service

in 1997 before online streaming platform.

→ first Netflix original series was House of Cards (2013)

→ The global massive hits of Netflix original are

Money Heist

wednesday

Stranger Things

and in India Delhi Crimes

Squid Games

sacred Games

Kota factory

"Better TV Experience"

1.) Personalized Recommendations:

AI uses few signals to show the recommended playlist of shows to watch under the option

Eg: "movies & shows you'll like..."
"top picks just for you..."
"similar taste to yours..."

2.) AI-Generated Thumbnails:

Netflix use diff poster images, gif for the same movie to diff users. AI decides which image you are mostly likely to click.

Eg: If you like comedy then thumbnail has funny scene from the show/movie.

If you like action then thumbnail has fight scene from the show/movie.

3.) Streaming Quality & Optimization:

AI studies global patterns & adjust video quality based on your internet speed. Reduces Buffering. Optimizes encoding so video loads smoothly.

4.) Parental Control:

It has diff profile for users to prevent the history being watched by family members / friends. AI uses rating region and provides subtitles for the content.

"SALES FORCE"

Founded: 1999 by Marc Benioff

Headquarters: San Francisco, California, USA

Core Business: The Pioneer of SaaS model globally.
(Software as a Service)

Salesforce: How AI helps Business Understand their customers
{ Business deals } { Applications }

1) Einstein Predictive Analytics - forecasts sales, predicts customer patterns and recommend next best actions.

2) Einstein Copilot (2024) - It is a conversational AI assistant (chatbot) for sales, service & marketing teams.

3) AI in CRM Automation - (customer relationship management)
It automates lead scoring, email, service ticket routing, etc.

4) Einstein QPT: It generates emails, summaries, reports and insights inside salesforce work space.

5) AI in Cloud Services: Auto solves & uploads queries-files,
suggests knowledge articles, analyze sentiment.

{ Highlights }

- World's #1 CRM provider with 20% global market share.
- Has 70,000+ over employees around 150,000+ companies.
- SaaS subscription is the base of revenue model.
- Has massive ecosystem with AppExchange, Partners, Integrators and developers.

"The AI usage"

- 1) Analyzes Customer Behavior Automatically:
AI tracks customer browse patterns like what they like, avoid, buy and etc.
- 2) Predictive Analytics:
AI uses patterns to forecast what customers will do next, such as probability of making purchase
- 3) Personalized feed:
AI recommends prices, ads, products & trends for each individual based on customization.
- 4) Understand customer sentiments:
AI reads & considers their reviews, feedbacks, social media insights, chats, requests and improves
- 5) Big data:
AI finds hidden insights in Big data of customers which is collected by companies.
- 6) Decision making:
AI often suggests product stocks, customer targets, prices, demands & trends to run the sales in profit with customer satisfaction.

"UBER"

founded: ^{March} 2009 by Travis Kalanick, Garrett Camp

headquarters: San Francisco, California, USA

core: Globally launched as (mobility as a service) MaaS and delivery company

Uber: Using AI To do Everything

{ Uber Does }

- 1.) Ride hailing (UberX, UberXL, Uber Auto, Moto, Premium)
- 2.) Delivery (Uber eats)
- 3.) Logistics & Freight (loaded goods on trucks)
- 4.) Rentals & corporate mobility
- 5.) Maps & routing technology
- 6.) Autonomous driving R&D / partners like Waymo, Aurora)

{ Highlights }

- 1 Billion + rides per quarter globally
- one of the largest gig-work platforms (task platforms which are paid for services)
- operates over 70+ countries & 10,000+ cities.
- listed on the New York Stock Exchange (NYSE) in 2019.
- name changed from UberLab to Uber ; first launched for premium users (Uber Black cars)
- started when Garrett Camp wanted a way to call a taxi using an app during snowstorm in Paris.

"AI does Everything"

1.) Matching Riders + Drivers:

AI decides drivers should pick which ride based on distance and fair. Also provides various transport options to riders with affordable fair. All this happens in milliseconds.

2.) ETA Predictions:

AI ETA (Estimated Time of Arrival) of driver by calculating trip duration, time and place. This observes line demand, driver availability, weather, big events.

3.) Route optimization:

AI selects best paths by considering traffic patterns, road closures, accidents, time of day, etc. This reduces delay of fuel usage & time.

4.) Safety Analytics:

AI monitors sudden brakes, speeding, phone usage, unusual stop and detours. It detects risks, and when triggers alerts or safety checks.

5.) Uber Eat Optimization:

AI decides delivery partner should pick up food, restaurant place, peak time of traffic and reduces late deliveries.

6.) Autonomous driving Research:

Uber's advanced AI team is working on self-driving car, lane & path detection.

"SIEMENS"

Founded: 1847 by Werner von Siemens, Halske

Headquarters: Berlin, Germany

Mkt: World's leading technology & engineering conglomerates.

Siemens: Using AI and analytics to Build the Internet of Trains

Siemens AG (Aktiengesellschaft) is a German multinational technology company. ↓

German term for a public limited company or stock corporation [just like Inc., PLC, LTD]

→ Initially named as Telegraphen-Bau-Anstalt von Siemens & Halske

→ Has 175+ years of Engineering expertise over 190+ countries.

→ World's best companies for automation & industrial AI.

→ Has multi tasks like

1.) Industry & Automation -

Most profitable & strongest sector. Has more than Drives, motors, sensors & software eg SIMATIC, TIA portal.

2.) Energy & Infrastructure -

Powers grid solutions, smart buildings & system. It has large scale infrastructure around the world eg: Trains, metros etc.

3.) Healthcare -

It was is global's best leader in medical tech like diagnostics system, AI tools, robotic surgery eg: MRI, CT, X-ray

4) Digital Technologies -

It has a new digital area where it invest in AI for industrial automation, IoT platform, softwares, etc eg: MindSphere, PLM etc.

"AI to Build The Internet of Trains"

Internet of Trains = Artificial Intelligence (AI) + Internet of Things (IoT)

- Internet of Trains is adopted by rail-industry for the infrastructure, tracks, signals, devices, etc.

1) Networked Ecosystem-

Instead of treating each train or rail subsystem separately, this system takes actions by digital data flow and executable actions.

2.) Railigent-

Its a new version of Railigent X. Its a cloud based analytics management platform which has smart monitoring & prediction for both trains & infrastructure.

3.) Big Data-

Siemens uses AI & tools for analytic model for training huge volume of data from sensors, systems.

4.) Digital Twin & virtualization-

it use energy supply, electrical load, n/w flows & planning design for optimization.

Benefits

⇒ Higher Reliability ⇒ Scalability &

⇒ Better assets

⇒ Improved performance

Meet schedule

"TESLA"

Founded: July 1, 2003 by Martin Eberhard, Marc Tarpenning
in 2004, investor - Elon Musk

Headquarters: Austin, ~~Tesla~~, USA
Texas

launched

Core: Automotive, Energy generation and Storage, Services & others

Tesla: Using AI to build Intelligent Cars

{ highlights }

- First Tesla car was all electric sports car Tesla Roadster (2008)
- It was named after Nikola Tesla, the legendary Serbian-American inventor known for AC electricity, radio Tech, etc.
- Tesla uses Tesla vision (camera based AI) instead of radars.
- World's largest EV manufacturer.
- The tech installed has OTA (Over the Air) software updates
- The tech installed has OTA (Over the Air) software updates
- Elon musk invested \$65 million in 2004 and later became CEO.

{ core }

1.) EV's (Electric vehicles)

2.) Self driving software & AI Systems

3.) Solar panels & clean energy products

4.) charging n/w (super chargers)

"AI for Intelligent Cars"

1) vision Based perception system:

uses Tesla vision, which has 8 surround cameras.
It detects vehicles, pedestrians, traffic signs, lanes,
traffic signals, road's & paths and obstacles.
It's AI is similar to human's eyes.

2) Neural Networks:

Its Neural net using DNN (deep neural net)
performs lane predictions, speed control, path
planning, object detection & behavior prediction.

3) Tesla's Dojo Supercomputer:

It built its own AI Supercomputer known as
Dojo, which collects billions of miles of real
driving data world wide for safety, accuracy,
generalization & updation.

4.) AI in factories:

Tesla's AI is used for its factories for robotic
automation, predictive device systems & optimization
through ML.

5.) AI energy products:

It produces powerwall, solar energy systems,
mega packs of storage. AI optimizes energy
distribution, load balancing & grid stability.