Business Application – Acquisition, Development & Implementation

(Chapter - 5 : DISSA Course) - AI (Part 2)

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ML types

- **Evolution of AI**
- 1986-Rise of Machine Learning
- 1990-Role of Expert Systems, DSS
- 1995- AI as Science
- 2018 - AI : Disruptive Technology

- **1. Supervised ML** = assets & operations modeled by humans selecting relevant sensors (tags) - statistically related & selected periods of archived Big Data that represent **"good behavior"**
- **Hence =** software can create digital signature of what is considered to be proper operation.
- Incoming real-time data is then compared to this digital signature,
- Deviations are identified as early warnings of asset / operational degradation
- **2. Unsupervised** =
- data is automatically analyzed,
- relationships among data are systematically determined,
- deviations from patterns of normal behavior are identified with no human intervention

ML Process

- ✓ Data chosen to train model = **feature,** Features = pixels of the images.
- If image = 28x28 size, dataset contains 784 columns (28x28).
- Here = each picture transformed into feature vector.
- Label tells : computer what object is in the image.
- **Algorithm** Pull the data, find pattern & classify it in corresponding class.
- 1st step = creating the feature columns.
- 2nd step= choosing an algorithm to train the model.
- 3rd Step = When training is done, model will predict what picture corresponds to what object.

4 P's of Industrial AI:

- **1. Predictive:** method of anomaly detection in near-real-time
- Based on ML , type of pattern recognition & anomaly detection leveraging Industrial Big Data to create digital signatures of assets & processes
- to detect both deviations & matching patterns =indicate early warning of pending problems & inefficiencies, errors in design process.
- Spot anomalies in how processes, equipment & assets are performing with advanced pattern recognition powered by ML.
- Early detection & warning of equipment failure, inefficiencies, errors in engineering, operations & performance improves safety, operational risk
- The **Big Data sourcing** =
- sensors, data base, calculated values, audio, video, SCADA , online meters , other control systems
- advanced pattern recognition = digital signatures of **normal behavior** of an asset or process are captured
- Then = **used as basis** of comparison with incoming, real-time data
- **AI apps -** identification of fraudulent claims & invoices,
- OCR for vehicle tracking & real-time safety monitoring within factories.

2. Performance based AI

- Based on simulation & ML = optimization system leveraging industry & asset specific algorithms and modeling techniques to provide early warning detection of pending problems & inefficiencies when compared to actual sensor values.
- Based on issues detected in Predictive & Performance analytics = Root cause analysis, optimized solutions, risk-based decision support guide user to most efficient decision
- Combination of both online & simulation software that leverages ML to baseline performance through advanced pattern analysis in order to ensure mathematical models accurately match operational reality.
- Deviations can be quickly detected = early action taken to rectify situation.
- **3. Prescriptive:**
- Based on issues detected in Predictive & Performance analytics = provides root cause analysis, planning & decision-support, & probabilistic courses of action to best remedy & optimize given situation.

- **4. Prognostics:**
- **Prognostics -** Forecast future events, schedules, & operational scenarios to manage risk, maximize profitability & improve sustainability
- Leveraging neural net, deep-learning, & reinforcement learning = provides forecast of future events.
- Used in **monitoring/control & scheduling optimization**
- Determining **how long an asset or process can continue to safely operate** (after anomaly has been detected) before failure or significant loss of functionality occurs.
- **Risk-based insight in decisions -** whether or not an operation should attempt to run to next planned maintenance outage.
- Can the system make it to next planned maintenance outage?

Use of Chatbots

A program designed to carry on conversation with human user

- Chatbots = computer programmes which mimic conversation with people using NLP & AI.
- Can interact with people on internet by initiating a conversation.
- Act as digital assistants = address queries regarding products or services
- Chatbots don't need to be downloaded, don't need storage space on devices.
- **Typical usage**

✓ Answering FAQs of users accessing websites,

✓ generate customer leads,

✓ Provide support services (HR, IT, Finance etc.)

✓ provide legal advice to user.

✓ Chatbots can work 24x7, with no disruption, accessed anytime anywhere.

Axis Bank – AXAA Chatbot

3 vectors - Growth, Profitability & Sustainability **(GPS)**

- Axis Bank partnered : Bengaluru-based - Vernacular.ai, AI-based SaaS Voice automation platform, to optimize voice AI solutions & automate customer interactions - intelligent human-like dialogue, by multilingual voice bot
- **Axis** Bank's "Dil se Open" philosophy – AXAA commissioned = 2020
- **Objective** = to address the increasing number of queries from customers more effectively and promptly amid the pandemic
- **Technology platform –AXAA**
- uses next-generation multilingual voice AI platform built on top of **VASR** (Vernacular Automated Speech Recognition).
- high-end STT (Speech-to-Text) Technology enables = convert audio to text by applying powerful neural network models in an easy-to-use API.
- System helped in solving 2,50,000 additional calls per month

AXAA features

- AI powered conversational banking IVR =
- *converse in English, Hindi and Hinglish*
- automated voice assistant deployed to have in-depth understanding of customer queries, context & intent of call.
- identifying various stylistic components from speech signals- identifying speaker characteristics : gender, age, location, etc.
- **Impact**
- Average call handling time by customer executives = reduced significantly
- Overall customer experienced = enhanced.
- 65%-70% of customers were being touched by BOT
- System supports over 10 languages, 27 self-service options
- In case, AXAA unable to service / cater to particular customer query, = designed to direct call immediately to human experts, minimising navigation time on conventional IVR

AI systems apps

- **AI based systems** : alert drivers if they doze off
- **Long distance transport , railways sector** : if driver's eyes closed > 3 secs, aural alerts / loud buzzer
- Tested on Army vehicles
- System handled to Telangana Govt for trials on commercial vehicles
- **Auto :** targeted marketing & online searches
- **I app :COVID Variant detection**
- **AI diagnostic kit**: can differentiate
- breaths' / Or CT Scan Or chest X-Ray
- between normal & affected person's
- AI : deployed for testing of **air samples – check virus floating in air**

❖ Online Shopping and Advertising

❖ AI in Education

❖ AI in Agriculture

❖ AI in Entertainment

❖ Web Search

❖ Smart homes ,cities and Infrastructure.

AI , RPA in healthcare

- **IBM Watson : the pioneer**
- AI- Develop AI Based algorithm
- **AI Capabilities:**

❑ Pattern recognition, computer vision

❑ Language & voice recognition

❑ **Robotic surgeries** –

❑ prostrate, neck, kidney, rectal cancer treatment

❑ Response assessment post chemotherapy

❑ Cervical cancer detection

- **IBM Watson** (AI tool) = derive meaning & context of set of structured & unstructured data critical for selecting a treatment plan & analyze patient's medical record to identify potential treatment. In other words,
- IBM Watson functions = human doctor.
- **Agro :** predict most efficient harvest times , precision agriculture HRI , SIRI

Retail and E-commerce

- Product recommendations on Amazon account = real-time application of complex AI algorithms to determine which products user more likely to buy
- Chatbots on on e-commerce websites = powered by AI & programmed to provide instant answers to common customer queries.
- **Banking and Financial Services**
- Human agents = replaced by intelligent software robots for processing loan applications
- **Robo-financial advisors** = sifting multiple levels of data in split seconds = recommend right investment decisions for customers.
- **Robo-advisors** = analyze Customer's social media activity, emails to identify sectors & companies aligned to his needs & objectives.

Insurance

- AI-based chatbots = deployed to improve customer experience & create insurance plans based on customers' data. reduced claim processing time
- **Fraud detection – BFSI**
- **Mastercard** uses AI-based Decision Intelligence technology to detect fraudulent transactions by analyzing various data points.
- **Real Estate**
- AI-powered bots = brokers / agents find perfect match for people looking to buy, rent / sell properties.
- AI-based chatbots operate 24*7 = real estate website visitors find answers to queries even during odd hours.
- **Entertainment and Gaming**
- AI is = program producers & broadcasters identify which shows or programs they should recommend to individual users based on their activity.
- AI = Netflix & Amazon provide more personalized experience to users.
- IBM Watson used = trailer- movie *Morgan*, released in 2016.

Logistics & Transportation

- Warehouses use AI-powered robots for sorting & packaging products
- AI algorithms : to find= quickest shipment route & support last-mile delivery.
- AI-based self-driving MAY replace manual driving someday.
- Tesla, Uber, Volvo & Volkswagen = forefront of this research.
- AI algorithms = traffic light management.
- **Cobots**
- Collaborative robots or "cobots" = take instructions from humans & work productively alongside them.

✓ Workforce training

✓ Process engineering & design, Maintenance and repair

✓ Operations forecasting & scheduling

✓ **QC** = AI algorithms used to notify manufacturing units of potential production faults = lead to product quality issues.

AI & RPA industry Uses= Aerospace

- Telecom & Satellites
- GPS – Civil & Military aviation
- ADS-B & ADS-C installations
- Ticketing Systems
- Flight Health Checks & Maintenance
- Flight plan envelope prediction for Fuel Efficiency
- Crew rostering & Management
- Luggage Tracking- IoT
- Airport Management
- Aviation cockpit electronics : Avionics :FMGC – alerts, aural warnings, TCAS , GPWS
- Space explorations - NASA Mars Perseverance Probe
- Earth observation
- Autonomous flight

AI in ISS - Space

- **CIMON =** Astronauts on ISS have highly-capable new "assistant"
- CIMON **(Crew Interactive MObile Companion**),
- AI-based robot developed for Germany's DLR Space Administration by **Airbus & IBM.**
- Trained by Airbus & IBM, powered by Watson – IBM question-answering supercomputer = use of AI allows businesses to integrate it into Ops
- Watson enables CIMON to learn continuously & engage with astronauts.
- **Future state** = will integrate virtual reality & augmented reality
- **HW** = standard & infrared cameras, USB ports & a screen that presents procedure-related data - photos, videos or documents.
- When inactive, shows CIMON's "face" – an emoticon-style display.
- CIMON = private button that astronauts can press if they do not want assistant participating in conversations.
- 3D-printed mechanical structure = over 30 cm. in diameter & weight 5 kg., made of plastic and metal.

AI : Apps- financial decision & analysis

- ML : Used in **major**
- share price predictions , Electronic trading
- Loan risk assessments
- Real estate valuations
- **IT sector**

❑ **Infosys** : USD 3.2 Bn transaction from Daimler AG

❑ **WIPRO** : USD 700 Mn deal with Metro AG

❑ **TCS** : recent client wins in EMEA

- **Music industry:**
- **Apple & Spotify** implement AI to understand users' engagement patterns & recommend **right music** to **right people &** at **the right time**
- **AI =** algorithms to study user behavior = becoming more intelligent with time
- **Evaluate=** user wants to purchase a product **for themselves or gifting**
- whether family members **have different watching preferences.**

Fintech apps: Corporate interventions in AI

- **1. Tata Sons** invested in AI platforms for :

✓ Chatbots , Voice assistants

- **a. TATA Capital:** Chatbot TIA helps in loan procurement
- **b. TATA Steel**: RICHA handles customer communication
- **c. TCS** : employee queries handled by CARA
- **2. M&M** : Club Mahindra = Chatbot 'Tripper'- interacts with customers on holiday packages
- **3. Godrej Group** : chatbot : Godrej Jersey scholarship contest
- **4. SBI :** SBI Intelligent Assistant (SIA)
- **5. HDFC Bank** ;Eva, **6. BoB :** 'Brainy'
- **6. Andhra Bank** : 'ABHi ', **7. Kotak Mahindra Bank :** 'Keya'
- **8. ICICI Bank** : software robotics deployed in > 200 business processes
- 750 software robots- 2 Mn transactions/ day : 20 % of transaction volumes
- **WIPRO – ''Holmes"**

Industry apps

- AI – Oil rig drilling prediction
- AI – Online fashion purchase – with 2 uploaded customer body's photos – AI decides whether apparel size fits customer: *rejections / refunds reduced*
- *AI = care giver to senior citizens –*

✓ *taking them for walk,*

✓ *medication,*

✓ *handling emergencies,*

✓ *monitoring of physical parameters ,*

✓ *household support*

✓ *Security alert*

✓ *companion etc*

Enterprise Fraud detection

- **AYASDI =** Proactive Controls
- Sensa™ advanced investigations interface
- **Find suspects within fraud rings quickly**: Networks of connected individuals, businesses, 3rd parties presented based on risk
- **Proactively spot new fraud patterns**: pre-aggregated summary information to spot patterns in large volumes of information automatically generated
- **Fits easily into existing ways of working:** Direct integration with enterprise case management or stand- alone investigator capabilities allows for efficient and flexible use

AI as - threat

- AI = **attractive to cyber criminals**.
- AI & ML improve ability & increase speed -hackers can find weaknesses within networks.
- Hackers = able to automate mounting of probes for attacks & ability to test & develop new malware
- ML = used to fine-tune language of phishing attacks –into something that sounds completely genuine & natural
- **Risk related to AI strategy**
- Lack of alignment between IT plans & business needs
- IT plans = inconsistent with organization's expectations or requirements
- Improper translation of IT tactical plans from & IT strategic plans
- Ineffective governance structures that fail to ensure accountability & responsibility for IT processes related to AI function
- Implementation time, Cost
- Job displacement

Robots = Vendor selection

- ***IS Auditor Consulting role = review areas***

1. Clearly laying down business requirements. e.g., geographic scope, vendor preferences;
2. Evaluate characteristics of vendors to best suit objectives e.g., integration capability, level of developer support;
3. Review vendor for specialized solutions
4. Determine appropriate delivery model & pricing structure

- 5. Flexibility & costs with licensing model of vendor tool
- 6. Vendor support for training, service desk support & implementation
- 7. Architecture structure of systems, interconnections & dependencies
- 8. Functionality capabilities related to level of support for RPA functions
- 9. Development effort
- 10. Management, auditing & logging capability
- 11. Effort for robot management, scheduling, event triggers & priorities

IS Audit of AI

- **Elements of AI Ecosystem**
- **1. Artificial intelligence ethics & governance models**
- Formal standards & procedures for implementation of AI engagements
- **2. Data and model management, governance & privacy**
- **3. Understanding human-machine integration, interactions, decision-support & outcome**
- **4. Third-party AI vendor management**
- **5. Cybersecurity vulnerability, risk management & business continuity**
- **Auditability** = possibility to evaluate algorithms, models, & datasets;
- to analyse operation, results , effects, expected + unexpected of AI systems.
- **Part 1** = technical -measuring performance of system according to several criteria (reliability, accuracy of results, etc.).
- **Part 2** = ethical part - apprehending its individual & collective impacts, checking that it does not pose risk of breaching certain principles of privacy or equality.

IS Audit of AI- Critical questions

A. How are AI initiatives aligned to enterprise strategy
B. Who will be responsible for use of AI & any mistakes it makes?
C. How to protect against new AI threats?
D. How to manage AI inventory?

- **IS Audit of AI & RPA**

1. Understand governance process of AI/ RPA;
2. Review process of identification of need, areas to be automated, KPI for automation & process of RPA tool implementation;
3. Review of system change management control, i.e., how changes identified, approved, tested, signoff of testing was given,
4. Analysing robotic controller –how algorithm scheduled in AI tool,
5. Reviewing of system blueprint & exception handling process;
6. Reviewing process of exception handling log;

- 7. Analyse periodic update & monitoring mechanism implemented by client for monitoring of BOTS.
- 8. Audit access control implemented in AI/ RPA, review:

✓ who can approve access to AI administrator,

✓ who has access to administer BOT,

✓ who have access to manage exception,

- 9. Re-run or make changes in AI/ RPA tool, etc.
- 10. Review of AI/ RPA transaction logs.
- 11. Perform testing of edit, validation check, error check, etc., configured in RPA /AI
- 12. Re-perform calculation & transaction reviews to ensure – results consistent.

ISACA Guidelines – AI

- Become informed about AI design & architecture to set proper scope
- Involve all stakeholders
- Mapping COBIT to Strategy: Create Visual Representation of how to apply COBIT® 2019 in Auditing of AI
- (**ITIL / ISO 27001** may also be used)
- Explain & communicate proactively about AI with Stakeholders
- Adopt & adapt existing frameworks and regulations
- Focus on transparency through an iterative process

Winning combo

- Robots unable to = exercise subjective judgment, build empathy or support customers' emotional needs.
- Not able to handle new situations & different from processes prescribed
- **Real benefits =** *combination of people, core platforms & robotics* so that:
- Core platforms support data records & automate highest value processes.
- Robotics run all repetitive, standardized processes
- People focus on adding value - strategy, deep customer relationships, managing exceptions, driving change & continuous improvement, & low-frequency activities that are not cost-effective to automate.