



TRANSFORMING HUMAN CAPITAL MANAGEMENT: FROM HR EXPERTISE TO AI-DRIVEN ANALYTICS

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Abstract

Since the beginning of time, human resources have been trying to improve its techniques of managing human resources, and it is also continuously working to improve with the most current trends in human resource management (HRM). The field of human resource analytics is receiving a lot of attention in this day and age, when analytics and data analytics are becoming more widespread. In recent years, a number of global businesses have made significant strides in the development and use of human resource analytics. The construction of dashboards, the evaluation of employee performance, and the calculation of a company's profit are all processes that may be accomplished with the help of the many human resource software and tools that are now available. Virtual workplaces were also used in this evaluation. In recent times, the department of human resources has also started to collaborate with predictive modelling. The function that predictive modelling plays is also explained by this study, which gives an explanation overall. For the goal of providing HR experts and practitioners with an explanation of HR analytics, including present trends and practical applications of HR analytics, the objective of this study is to make this explanation available. As part of the field of human resources (HR), recent developments in fields like as artificial intelligence (AI) NLP, machine learning (ML), talent analytics (TA), automation (AI), the internet of things (IoT), and gamification are also contributing to the preservation of a culture that values technology.

Keywords: Human resource analytics, Human Resource practices, HR Analytics tools, Machine Learning augmented Analytics, Virtual workspace, online onboarding solutions, People Analytics, Exit Data, Predictive modeling.

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Introduction

HR Analytics: Introduction

It is possible to describe human resource analytics (HR analytics) as the area of analytics that is used to get outcomes that are driven by data and to take an analytical approach to dealing with issues that arise within an organization in order to enhance employee performance and retention. The COVID-19 crisis has caused a shift in working patterns and flexibility in the workplace, which has led to the introduction of new techniques or technologies. These methods or technologies have been there for decades, but they gained a lot of relevance once their full potential was realized during the pandemic. There is recent research that offers a complete overview of the available literature on human resource analytics (Qamar & Samad, 2022). The Chartered Institute of Personnel and Development (CIPD) (2018) states that analytics is also known as people analytics since it employs people facts in a logical approach to rectify HR merchandising issues. Through the provision of robust and actionable business knowledge on the "people side" of retailing, HR analytics helps to bring about a significant increase in profitability. The transformation of human resources from a tactical support function into a strategic partner is being facilitated by HR analytics, which is providing assistance to organizations. Smith, T. (2013)'s work. (Liu et al., 2020) Human resource analytics gives human resources professionals the ability to make strategic contributions and provide support for management decision-making. HR analytics is also a discipline that is based on evidence, and it is used to make better choices about the people side of the company. It is comprised of a line of tools and technology, ranging from straightforward reporting of HR data to predictive modeling. As of 2011, Bassi.

People have a tendency to confuse HR analytics with HR metrics, but the truth is that HR analytics encompasses more than just HR metrics. It employs a comprehensive collection of methodical tools that provide notification for HR strategy and decision-making, as stated by Marler and Boudreau (2017). This is accomplished through the use of evidence-based evaluation. In the realm of human resource planning and strategy, there exists a tool known as the HR Analytics Dashboard. This tool is particularly useful for the HR Department and other stakeholders. In today's world, HR dashboards are used by a broad variety of organizations, both big and small, in order to evaluate the growth of their staff. Additionally, HR analytics contribute to the enhancement of the organization's overall performance. McCartney and Fu (2022) found that the outcomes of a recent study

provide credence to the chain model that was presented. The study suggests that having access to HR technology allows for HR analytics, which in turn promotes EBM, which ultimately leads to an improvement in organizational performance. In order to improve people-related performance, operational effectiveness, and ultimately the influence of the company plan, HRA provides a tool that can be used to get analytical findings that are supported by evidence. Human resource analytics (HRA) has an effect on several levels of an organization, ranging from the level of individual workers to the level of HR activities and the overall strategy of the organization (Jiang & Akdere, 2022).

HR analytics is a method that is supported by evidence and is used to enhance both individual and organizational performance by providing better alternatives for businesses and organizations. A great number of other terms, such as HR analytics (for example, Marler and Boudreau, 2017), talent analytics (Davenport, 2010), human capital analytics (Minbaeva, 2018), HR big data analytics (for example, Martin-Rios, 2017), hyper-personal analytics (Warshaw, 2015), and analytics-based HR practices (Ramamurthy, 2015), are described in detail. In order to examine the link between different HR methods, practices, and the outcomes of organizational activities, it is necessary to understand and evaluate the process of HR analytics. This is accomplished through the use of statistical tools and experiments..

Evolution of HR Analytics

According to Cheese et al. (2007), the concept of human resources (HR) and its expenditures have become significant in terms of how effectively the final refines the primary idea. In modern times, the duty of an HR has evolved from that of "personnel control" to that of "personnel creator," along with "talent multiplier." From the beginning of the scientific management period to the present day, there has been a significant amount of investment in the development of methods that are aimed at preserving the effectiveness and efficiency of workers (Taylor, 1911). The cultural dimension hypothesis was developed in 1980 after a number of experiments, including the Hawthorne investigations in 1920, behavioural evaluations, and Hofstede's establishment of a people research department at IBM in 1960 had been conducted. In addition, industrial and organisational psychology (Munsterberg, 1913) was used as a tool for evaluation; nevertheless, HR metrics and HR analytics emerged much later. 'HR Analytics' is differentiated from 'HR metrics' in an article that was published in Human Resource Planning and

titled 'HR Metrics and Analytics: Use and Impact' (Lawler, Levenson, and Boudreau, 2004). The Human Resource Planning Society wrote this paper. Estimates of essential outcomes in human resource management (HRM) are referred to as HR metrics. These metrics may be categorised as either efficiency, effectiveness, or impact.

The authors Lawler et al. (2004) claim that human resource analytics are not measurements but rather statistical methodologies and experimental approaches that may be used to demonstrate the impact of human resource operations. Fitz-Enz (1984) and Fitz-Enz and Davidson (2002) are responsible for the majority of the HR measures that are used now on a daily basis. In collaboration with one another, the Saratoga Institute and the Society for Human Resource Management established a number of measures. 1996, Kaplan and Norton. According to Cayrat and Boxall (2022), a researcher has also provided a solution to the question of "New Modern Days: Challenges, Risks, and Impacts of Human Resource Analytics" published in the article. According to Cheese et al. (2007), the concept of human resources (HR) and its expenditures have become significant in terms of how effectively the firm refines the primary idea. In modern times, the duty of an HR has evolved from that of "personnel control" to that of "personnel creator," along with "talent multiplier." From the beginning of the scientific management period to the present day, there has been a significant amount of investment in the development of methods that are aimed at preserving the effectiveness and efficiency of workers (Taylor, 1911). The cultural dimension hypothesis was developed in 1980 after a number of experiments, including the Hawthorne investigations in 1920, behavioural evaluations, and Hofstede's establishment of a people research department at IBM in 1960 had been conducted. In addition, industrial and organisational psychology (Munsterberg, 1913) was used as a tool for evaluation; nevertheless, HR metrics and HR analytics emerged much later. 'HR Analytics' is differentiated from 'HR metrics' in an article that was published in Human Resource Planning and titled 'HR Metrics and Analytics: Use and Impact' (Lawler, Levenson, and Boudreau, 2004). The Human Resource Planning Society wrote this paper. Estimates of essential outcomes in human resource management (HRM) are referred to as HR metrics. These metrics may be categorised as either efficiency, effectiveness, or impact.

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In the beginning, during the time of Hawk (1967), the majority of the HR measures that are now in use were developed. It is essentially an evidence-based method for making decisions about the people side of the problem, and it entails the organisation of tools and mechanisms, ranging from the description of HR indicators to predictive modelling (Bassi, 2011, p. 16). HR analytics is a simple technique.

The "Moneyball Concept" was a notion that was discovered by Lewis in 2003. It is based on the viewpoint use of measurements, which began to grow on a wide scale in the year 2006. In 2009, Google discovered the most important characteristics that are necessary for a successful manager. In order to do this, Google developed "Project Oxygen," which resulted in a significant shift away from traditional HR metrics and towards HR analytics. In addition to this, Google highlighted the applications and use of HR analytics inside organisations.

1978: an article "The measurement Imperitive" proposed an idea of Measuring HR activities 1978- Jac Fitz-enz – establishment action in HR departments-lot of resistance.

1990: predictive and assessment models became a subject of study field of HR Analytics remained unknown to many.

2000: the emergence of HR Accounting and utility analysis was observed.

Early Adopters: Google, Microsoft, IBM, Mindtree, Wipro etc

HR Analytics tools:

Various HR Analytics tools are used to create dashboards and get data driven results and analytical solutions to HR. There are few tools mentioned here to help in HR solutions saving time and money.

Sr. No.	Tool/ Software	Description
1	R	R is used to store data, Analyze Data, create Statistical models. Millions of analysts, researchers and brands are using R to resolve their complex issues.
2	Excel	It's a basic tool to learn for beginners .it is easy to learn and easily accessed by all users. It can uphold high volume of data and various operations can be performed. Excel is basically a spreadsheet.
3	Tableau	It is data visualization tool it works by transforming Raw Data in easily understandable format. It is in the form of dashboards and worksheets.
4	SPSS	SPSS Stands for "Statistical package for the social sciences". It is used for interactive or batched statistical analysis. Creating table charts, opening and editing data file performing various operations, all this can be done using SPSS.
5	Python	Python is a high-level programming language. It is used for developing website & software, task automation, data analysis and data visualization.
6	Power BI	It gives connected visualizations and business intelligence potentialities with an advantage for end users to create their own Reports & Dashboards
7	Visier	It is a pre-built analytic solution. It helps to see the truth. It helps leaders to make immediate, informed decisions.
8	Qlik	It is the top Data visualization & Business intelligence vendor. It is widely used for Integration of Data, Conversational Analytics and transforming raw data into meaningful information.
9	Oracle HR Analytics	Oracle Analytics improves Data driven Decisions for HR. It harnesses business analytics into an intelligent business process.
10	CPLEX optimizer	It gives flexible, high performance problematic solution for Linear and mixed integer function also sometimes Quadratic programming.
11	Stata	It is the complete, integrated best software package which gives everything required for Analysis of data as well as for statistical solutions.
12	Minitab	It is one of the best statistical analysis software widely and mainly used for Statistical Research.
13	JASP	It is same as SPSS, it is an open-source Program.

Table: 1Let's take a closer look at some of the technological components and recent advancements in the field of human resources (HR) that are associated with artificial intelligence (AI), machine learning (ML), talent analytics (TA), and automation:

1. In the field of human resources, Artificial Intelligence (AI) and Machine Learning (ML) AI and ML are becoming more important in the process of modernising HR activities. They are doing this by automating mundane processes and providing deeper insights into workforce management. A few important technological considerations are as follows:

The screening of resumes and the selection of candidates are both performed by artificial intelligence algorithms. These algorithms scan resumes and analyse them in comparison to job descriptions. **Natural language processing (NLP)** is utilised to understand and match qualifications.

Chatbots for Human Resources Questions: Chatbots powered by artificial intelligence are able to manage employee requests and provide rapid solutions to regular HR-related issues. ML is used

by these systems in order to enhance the accuracy of their responses over time.

Staff Sentiment Analysis: Companies use machine learning methods to analyse communication patterns and feedback in order to evaluate staff morale and satisfaction. This is often accomplished via pulse surveys and internal communication and collaboration platforms.

2. Talent Analytics (TA) Talent analytics is a technique that makes use of data analytics tools and software in order to forecast employee performance, plan workforce requirements, and improve employee retention methods. In the field of predictive analytics, TA models provide predictions about future employee behaviour by using previous data. These predictions include the probability of work

satisfaction, the possibility of employee turnover, and future performance trends.

For the purpose of workforce planning, sophisticated algorithms analyse patterns in order to assist in predicting personnel demands, identifying skill shortages, and recommending training programmes.

Optimisation of Employee Performance: Analytics solutions monitor performance data and provide insights that assist managers in optimising the performance of their teams as well as the career trajectories of their employee employees.

3. The use of automation in human resources

The use of automation in human resources not only makes administrative duties more efficient, but it also frees up human resources experts to concentrate on more strategic endeavours.

Automated Onboarding Procedures: Tools that automate the onboarding process guarantee that newly hired employees are incorporated into the firm in a timely and effective manner. These tools include systems that automatically schedule training sessions and monitor the completion of relevant documentation.

The administration of payroll and benefits is handled by automated systems, which handle complicated calculations for payroll processing, tax withholdings, and benefits management. This helps to reduce mistakes and ensure compliance with rules.

Automation tools that monitor employee hours, manage leaves, and interact with payroll systems facilitate the simplification of operations and the reduction of inconsistencies. These systems are known as time and attendance systems.

Integration and Prospective Courses of Action

The integration of artificial intelligence, machine learning, technical assistance, and automation in human resources is not simply about replacing human jobs; rather, it is about increasing and supporting the capabilities of the HR department to make choices based on data and improving the entire employee experience.

Ongoing developments may include the following:

Enhanced Personalisation

As artificial intelligence and machine learning continue to evolve, it may become possible for human resource management systems to provide workers with more personalised career development plans that are tailored to their specific abilities, performance history, and career goals.

Increased Capabilities for Prediction: As the data gathering process grows more robust and

algorithms become more complex, the predictive accuracy of these tools will continue to increase, which will result in more dependable predictions.

Ethical Applications of Artificial Intelligence

As the usage of AI in human resources (HR) continues to grow, ethical concerns around privacy, prejudice, and transparency are becoming more important. The creation of ethical artificial intelligence frameworks that safeguard employee data and guarantee justice in automated decision-making is expected to be the primary focus of future advancements. These technological improvements represent a movement towards a human resources approach that is more efficient, responsive, and data-informed. This transition highlights the significance of integrating these technologies in a strategic manner in order to support both the objectives of the organisation and the well-being of its employees.

HR Analytics Smart Strategies

- **Virtual workspace:** Tools which are used to utilize this technology bit.ai, Heyspace, Bluescape, sococo, Flock, Focusmate . Virtual workspace is a workspace is a workplace which is not physically located at single space instead of that many workplaces are technologically connected with it with no physical boundaries. In Covid Situation when almost entire nation was doing work from home virtual workspace in many organizations played an important role. Virtual Desktop Infrastructure has been here since decades but after covid-19 pandemic it became a Game Changer as suddenly entire system switched to Remote Working. Due to its flexibility and high speed it is required during work from home and advancement in the technology in future will help more in upcoming time.
- **Culture Tech Platforms:** tools such as CultureIQ is used to assess such technology with 4.6% user in India.
- **Recruitment/Marketing /Job Portals:** LinkedIn marketing, Glassdoor and many other such platforms are used by 90.6% of user India. Such tools are in use before the pandemic too as such tools are easily assessable and user friendly both for HR and for the candidate to assess but in such platforms exceedingly rare, decent quality results are observed.
- **On boarding Solutions:** Basically the purpose of on boarding program is to transfer necessary skills and knowledge required during contribution in an organization. Boarden provide solutions for on boarding also it helps

in improving retention with 14% usage of this tool.

- **People Analytics:** People Analytics is the use of analytics methods to improve and optimize performance of business. Various popular tools like Python, R, Power, Visier with 84% of usage rate. It helps HR in Inside Decision Making and to differentiate between various choices.
- **AI and Machine Learning Augmented Analytics:** Augmented Analytics is the use of technology helping in data presentation, insight generation with explanation to augment how individuals analyze data in BI Platforms. It helps in tracking employee performance and trends with 32% usage rate it is the technology which has the highest scope and opportunities in future as AI and Machine Learning is affecting all fields thus enhancing HR Solutions. It improves employee engagement. Tools such as MINDMATCH and HR FORECAST are used to utilize such innovative technology. AI-driven

analytics is also explored, demonstrating how predictive and prescriptive analytics empower HR leaders to make data-informed decisions about workforce planning, employee engagement, and talent retention (Harisha et al., 2023). ML applications are strongest in the areas of recruitment and performance management and the use of decision trees and text-mining algorithms for classification dominate all functions of HRM. For complex processes, ML applications are still at an early stage; requiring HR experts and ML specialists to work together (Garg et al., 2022). For better handling employee files, profiles, turnover, data analytics, and the creation of electronic personal data sheets for government service records, a human resource information system that incorporates machine learning has been created (Indarapu et al., 2023).

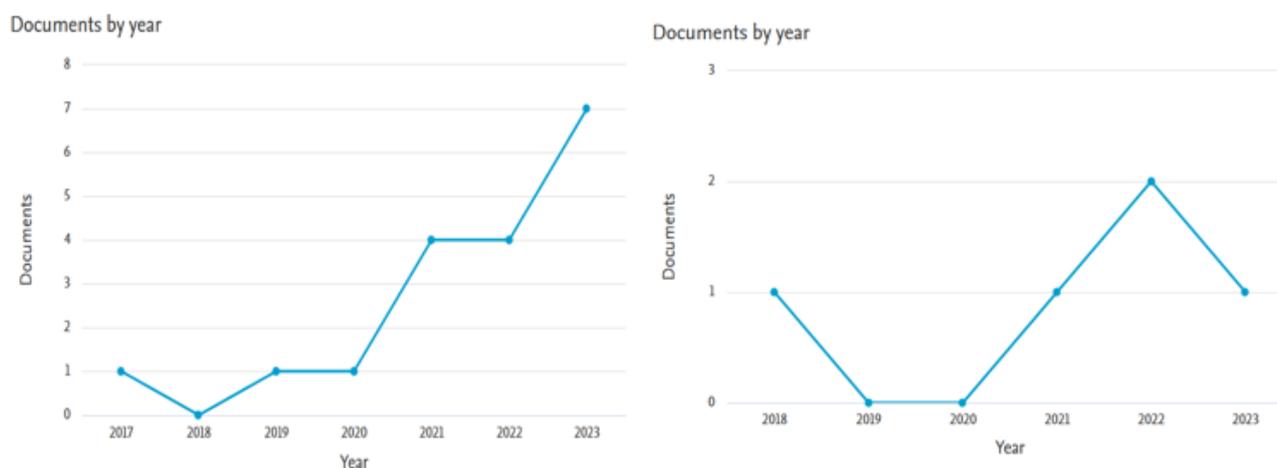


Fig 1: Showing Increasing Trend of Artificial Intelligence in HR in Left and Machine Learning In Right Graph

Learning and Development: Such tools help in online employee training and development though this technology is not used by many organizations but from the last decade there has been a hike in adaptability of this innovation. Tools like Gamification, Talent Guard and AI are useful in this. This technology is used much after Covid-19 during work from home practice.

Types of HR Analytics:

We can use various kinds of Data Analytics methods to understand HR Analytics

Gartner's model has described various kinds of Data Analytics which are discussed below:

1. **Descriptive Analytics:** Simply Explains

“WHAT” as it changes Raw Data from various Sources to give relevant information into past. It tells something is either wrong or right without explaining any reason.

3. **Diagnostic Analytics:** The Data collected in descriptive analytics can be arranged against other information to knowledge. The topic of “why” is explained well in this part.

4. **Prescriptive Analytics:** prescriptive analytics uses Modern tools & technologies like Machine Learning, Business Rules, algorithm, which makes it advance to manage.

5. **Predictive Analytics:** It gives something associated with future. It uses Futuristic approach. It uses Diagnostic & Descriptive Analytics to identify future trends, which makes it an important tool for estimating.

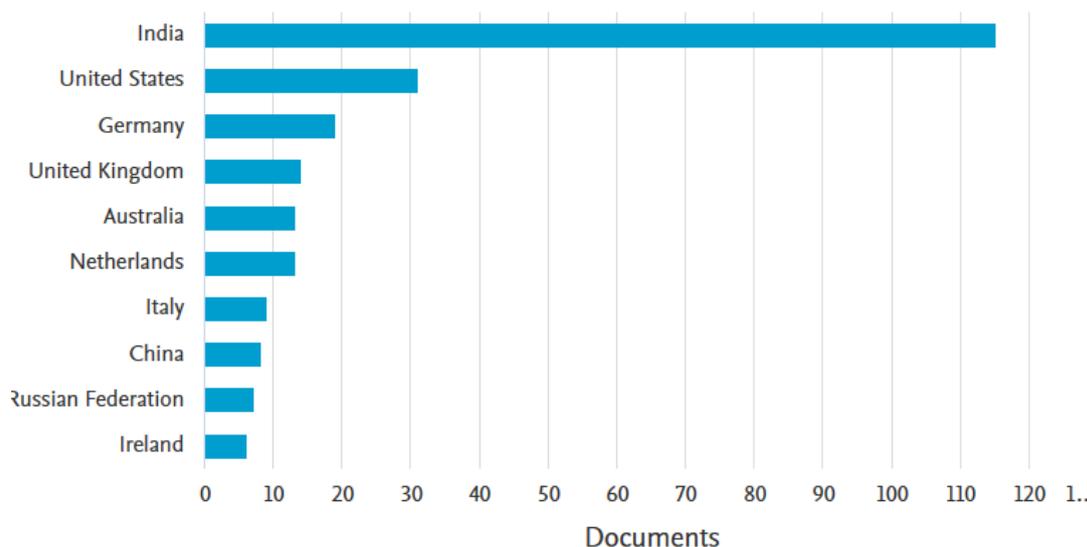


Fig 2: Which Country Contributing more to HR Analytics

Role of Predictive Analytics

Predictive analytics is a branch of advanced analytics that utilizes statistical algorithms, machine learning, and data mining techniques to analyze current and historical data to make predictions about future events or trends. Predictive analytics is a branch of analytics that uses input data, statistical combinations and ML statistics on predicting the probability of a particular event happening, forecast future trends or outcomes utilizing on-hand data with the final objective of improving the performance of the corporation (Kumar and Garg, 2018; Davenport et al., 2020; Espadinha-Cruz et al., 2021; Izagirre et al., 2021). The primary goal is to identify patterns, correlations, and relationships within the data that can be used to forecast future outcomes.

Here's a breakdown of key concepts related to predictive analytics:

1. Data Collection:
2. Data Preprocessing.
3. Model Building.
4. Training the Model.
5. Validation and Testing.
6. Predictions
7. Evaluation
8. Deployment

Predictive analytics is applied in various fields, including finance, marketing, healthcare, manufacturing, and human resources. It enables organizations to anticipate future trends, identify risks

and opportunities, optimize decision-making processes, and gain a competitive edge by making informed and data-driven choices.

The term predictive analytics refers to the use of Statistics and modeling techniques to make predictions about future outcomes and performance. Predictive analytics looks at current and historical data patterns to determine if those patterns are likely to emerge again this helps a lot to predetermine unwanted events occurring in future like sudden attrition, control over costs and many other metric controls. This allows businesses and investors to adjust where they use their resources to take advantage of possible future events. Predictive analysis can also be used to improve efficiencies and reduce risk. After pandemic predictive analytics are required for the prediction of continuing Covid waves. Like first wave was in 2019 second wave was followed by first wave for many countries after 8 months -12 months. Few counties have already experienced third wave so basically we can say that for prediction of Covid waves and damage associated with it can be predicted through Predictive Analytics.

Importance of predictive modeling in HR:

- HR Predictive Analytics helps HR in Forecasting the impact of new policies on employee overall performance
- It helps in prediction of attrition risk so that HR can predict new cost per hire and training and development cost.
- Helps in improving parameters of Exit Data. Exit data tells that if particular

policies/aspects are not improved employee will keep leaving organization.

- It can also be used in improving customer satisfaction.
- High Turnover Cost and cost of losing Bulk Employees was bearded by much organization during covid-19 due to lockdown imposed by many Asian, European countries. Predictive HR Analytics helps in forecasting such losses.
- Helps in Loyalty Analysis of existing employees.

Predictive HR Analytics trends after 2020:

Antecedents and consequences of Predictive HR Analytics was also studied in 2021 with the help of conceptual framework to understand PHRA better (Gurusinghe et al., 2021).

1:Recruitment and Talent Acquisition: Resume Screening: AI algorithms analyze resumes to identify qualified candidates based on predefined criteria.Chatbots and Virtual Assistants: Automated chatbots conduct initial candidate interactions, answer queries, and schedule interviews, improving the efficiency of the recruitment process.

2:Predictive Analytics and Workforce Planning: Organizations use AI-driven predictive analytics to forecast workforce trends, identify potential talent gaps, and optimize workforce planning strategies.

3:Employee Onboarding:AI-powered onboarding processes help streamline administrative tasks, provide relevant information to new hires, and facilitate a smoother transition into the organization.
Employee Engagement and Experience:

4:Sentiment Analysis: AI tools analyze employee feedback and sentiment to gauge overall engagement and satisfaction levels.

5:Personalized Learning: AI-driven platforms recommend personalized learning and development opportunities based on individual employee profiles and career goals.

6:Performance Management: AI is applied in continuous performance monitoring, providing real-time feedback and insights into employee performance.Data-driven performance assessments help identify areas for improvement and skill development.

7:Diversity, Equity, and Inclusion (DEI):AI is

used to detect and mitigate biases in HR processes, promoting fairness and inclusivity in recruitment, performance management, and other areas.

8:Employee Well-being:AI-driven tools monitor and assess employee well-being, identifying potential signs of burnout or stress. This data can inform HR strategies for promoting a healthier work environment.

9: Natural Language Processing (NLP): NLP technologies power virtual assistants and chatbots, facilitating natural language interactions between employees and HR systems.

Natural Language Processing (NLP) is an area of artificial intelligence (AI) that specifically aims to empower computers with the ability to comprehend, interpret, and produce human language in a manner that is meaningful and valuable. Below is a detailed analysis of the technical workings of Natural Language Processing(NLP):

Tokenization: is the first stage in natural language processing (NLP) when a given text is divided into smaller components known as tokens. The tokens may vary and may include words, phrases, or even individual characters, depending on the particular job at hand.

Stopwords Removal: Stopwords refer to often used words like as "the," "and," "is," etc., which typically lack significant significance within a certain context. Eliminating these elements aids in reducing the complexity of the data and may enhance the efficiency of certain natural language processing (NLP) jobs.

Stemming :is the process of reducing words to their root form by deleting suffixes, while **lemmatization** is the process of reducing words to their base or dictionary form. This approach aids in minimising the variability in the textual data, hence enhancing the model's capacity to generalise.

Part-of-Speech (POS) Tagging : is the process of assigning a specific part of speech (such as noun, verb, adjective, etc.) to each word in a phrase. This information is essential for several Natural Language Processing (NLP) tasks, including syntactic analysis and named entity identification.

Named Entity Recognition (NER): is the task of recognising and categorising named entities referenced in text into predetermined categories, such as person names, organisation names, and places.

Syntax and Parsing: Syntax analysis is the examination of the grammatical structure of sentences in order to comprehend the interconnections among words. Parsing algorithms are used to generate a parse tree, which depicts the syntactic organisation of a phrase.

Semantic analysis is a process that seeks to comprehend the deeper meaning of text, going beyond its surface-level interpretation. These tasks include sentiment analysis, semantic role labelling, and word meaning disambiguation.

Word Embeddings: Word embeddings are compact vector representations of words that capture the semantic meaning by considering the surrounding context of the words. Word2Vec, GloVe, and FastText are frequently used techniques for generating word embeddings.

Deep learning models: such as recurrent neural networks (RNNs), convolutional neural networks (CNNs), and transformer models like BERT and GPT, have significantly transformed the field of natural language processing (NLP) in recent times. These models possess the ability to acquire intricate patterns in textual input and execute tasks such as language translation, text summarization, and question answering.

Evaluation metrics: are used to assess the performance of NLP models. These metrics vary depending on the task and include accuracy, precision, recall, F1 score, BLEU score (for translation tasks), and ROUGE score (for summarization tasks).

10:HR Analytics and Reporting: AI supports advanced analytics, providing insights into workforce trends, turnover predictions, and the effectiveness of HR initiatives.

11:Talent Development and Succession Planning: AI is used to identify high-potential employees and recommend personalized career development paths. Succession planning benefits from AI-driven insights into leadership potential

12:Remote Work Support: AI technologies assist in managing remote work scenarios by facilitating virtual communication, collaboration, and monitoring employee productivity.

Ethical AI and Bias Mitigation:

Artificial Intelligence Tools and Technologies Frameworks for Machine Learning

TensorFlow, created by Google, is extensively

used for both research and production in a broad range of artificial intelligence applications.

PyTorch, developed by Facebook, is widely used in the research community because to its versatility and the ability to do dynamic computing graph.

Scikit-learn is a Python package that combines a diverse selection of cutting-edge machine learning methods for medium-sized supervised and unsupervised situations.

Frameworks for Deep Learning

Keras is an application programming interface (API) that operates on top of TensorFlow. It is specifically meant to be user-friendly and intuitive for humans, rather than being optimised only for machine efficiency. It streamlines certain parts of constructing deep learning models.

Caffe is a deep learning framework designed to prioritise expressiveness, performance, and modularity. The development of this project is a collaborative effort between the Berkeley AI Research (BAIR) and community participants.

Cloud services

Google Cloud AI Platform offers contemporary machine learning services, including pre-trained models and a tool for creating customised models.

AWS Machine Learning provides a range of artificial intelligence services and tools for tasks such as automated voice recognition, visual search, picture identification, and more.

Microsoft Azure AI is a comprehensive suite of artificial intelligence services and cognitive application programming interfaces (APIs) that enable the development of intelligent applications. These applications are capable of seeing, listening, speaking, comprehending, and interpreting user requirements utilising natural modes of communication.

Natural Language Processing (NLP) tools and technologies Natural Language Processing Libraries

NLTK, short for Natural Language Toolkit, offers user-friendly interfaces to more than 50 corpora and lexical resources, including WordNet. It also provides a range of text processing modules for tasks such as classification, tokenization, stemming, tagging, parsing, and semantic reasoning.

spaCy is renowned for its exceptional speed and proficiency in handling extensive information extraction jobs. The package consists of pre-trained statistical models and word vectors, and has the capability to handle more than 60 languages.

Gensim is highly suitable for unsupervised topic modelling and natural language processing, using advanced statistical machine-learning techniques. Language models and transformers

BERT, also known as Bidirectional Encoder Representations from Transformers, is a revolutionary paradigm developed by Google that has transformed the way context is included into language models.

GPT (Generative Pre-trained Transformer) refers to OpenAI's models that are renowned for their capacity to produce coherent and contextually appropriate text in response to supplied prompts.

The Transformers Library by Hugging Face offers a vast collection of pre-trained models that may be used to carry out various text-related tasks, including categorization, information extraction, question answering, summarization, translation, and text synthesis. These models are available in more than 100 languages. Development and collaboration tools

Jupyter Notebook is an online tool that is open-source that enables users to create and share documents that include live code, equations, visualisations, and narrative prose.

GitHub is a widely used website that facilitates the sharing and collaboration of code. It incorporates a version control system to monitor the advancement of your tasks.

Organizations focus on implementing ethical AI practices, ensuring fairness, transparency, and accountability in AI-powered HR systems.

- Virtual onboarding and training.
- Performance Management.
- Predictive Reports.
- Emphasis on employee Well-Being.
- Revolution of HR tools, processes and methods.
- Interactive Dashboards and usage of visuals

Popular methods of predictive Decision Modeling:

- Least-squares model
- Line of best fit
- Linear Programming / Optimization (Maximum profit Minimum cost model)
- NPV Methods
- Multiple Regression

Popular predictive analytical tools: (Source: Predictive analytics in HRM, Nijjer)

ANN-Artificial Neural Networks: For complex relationship between dependent and independent variable tools such as General Linear Model or Artificial Neural Network are used. ANN are used to model complex functional relationships. It is used to model any type of complex functional relationships and do not require pre specify relationship between covariates and response variables.

Decision Trees-Decision trees present the structure of decision making in a tree like manner. There are type of decision tree such as Classification tree and Regression tree. The Algorithm used to apply decision trees in various statistical packages is known as CART (Classification & Regression tree). DT is a tree-based technique in which any path beginning from the root is described by data separating sequence up to Boolean outcome (either true or false) at the leaf node was achieved (Jijo and Abdulazeez, 2021). It follows a series of questions that provide separation at each level and split points derived from the questions that can be discrete values, a range, or a probability distribution (Hartman, 2021).

KNN: K- nearest neighbor is abbreviated KNN, is a supervised learning algorithm, which is applied for classification and regression. Similarity and neighboring items are calculated by Euclidean Distance, Manhattan Distance & Minkowski distance. Most popular method is Euclidean Distance.

For predictive HR Decision, sometimes we use Regression Analysis. Regression analysis is a way of mathematically finding out which of those variables does indeed have strong impact among all (Amy Gallo, 2015). Regression analysis is a reliable method of identifying which variables have impact the most. Regression is shown X-axis –horizontal line and y- axis-vertical line.

Discussion

Data and HR Analytics is required nowadays a lot as it is required for creating Open –Ended Surveys questions, Sampling Employees, collecting and merging facility ,IT(Network/system) data, risk and adherence of data into their existing HR data depository. Existing Data and new data are required much in digital format from hiring till learning and development, from talent acquisition to payroll, managing remote work to analyzing people analytics every single role is going to be done digitally at online platform for this HR Analytics is going to play an important role in it. Various HR Metrics like Time to Hire and Recruitment Cost to hire will be managed effectively and also

monitored well for analyzing performance and managing cost related decision and supervision by HR. Therefore, Demand and rise of HR analytics is remarkable after post Covid 19 and new techniques methods, metrics will be used by all types of small, medium and large organizations rapidly and use of analytics in HR will keep on increasing till next upcoming Decade.

Conclusion

From improving Medicine to optimizing business to remote technology, Artificial Intelligence and Machine learning are rapidly changing faces of science and business. Like in HR automatic interview Scheduling with real-time Feedback decisions is one of the most important uses of AI in HR. According to studies employee productivity is boosted by AI – based HR Solutions saving time and money. After Post Covid era use of HR Analytics is mandatory for some organizations due to work from home. Various HR Practices are carried out virtually with remote technology leading many organizations to understand Analytics and Dashboards to review their employee performance. Further existing organizations and almost all upcoming organizations will also understand the need for HR Analytics soon for better output and results in organization.

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