The Impact of the Fourth Industrial Revolution and Machine Learning on Employee Skill Sets for Sustainable Survival in the Retail Industry

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Abstract

This study explores how employee skill sets in the retail industry are affected by the Fourth Industrial Revolution (4IR). Traditional retail has a strong need to change as technology rapidly alters consumer expectations. The study examines how workers develop new skill sets to remain competitive in the rapidly evolving 4IR market. Workers need to reevaluate and expand their skill sets because of the rapid changes in the Fourth Industrial Transition. The research dilemma highlights this. Workers are being forced to constantly broaden their skill sets due to the quick obsolescence of specific skill sets brought about by integrating technology, especially artificial intelligence. The primary study question focuses on how retail employees ensure their skill sets are still relevant in the face of the Fourth Industrial Revolution's disruptions. The study aims to identify the tactics retail employees use to get ready for how 4IR affect their skill needs. It's significantly contributes to the area by offering insightful information about staff competencies in a retail setting. Feedback from participants provides insight into the strategies and training used to enhance skill sets and overcome 4IR's obstacles. The study expands on earlier research to better understand how 4IR influences retail employee skill sets. The investigation is expected to highlight the degree to which workers need to improve their abilities, acting as a resource for those looking to grow in the 4IR age.

Despite acknowledging its limitations—namely, the limited sample size to Liberty Midlands Mall and the effect of the COVID-19 epidemic on interview techniques—the study nevertheless offers essential information.

Keywords
Fourth Industrial Revolution, Retail Industry, Employee Skills, Technology Impact (Machine Learning Algorithm), Skills Development.

Introduction
The Fourth Industrial Revolution (4IR) has brought about a significant upheaval in the retail sector. In addition to changing consumer behavior, technological developments—especially in artificial intelligence—have forced traditional retail companies to reevaluate their operations. Retailers face increased pressure to adapt to changing consumer demands by embracing innovative technology as speed, price, and style become increasingly important considerations (Chung et al. 2021). The fact that many stores have closed in recent years is proof positive of the revolution's profound effects (Liebenberg et al. 2022). Robert J. Sheller urges firms to prepare for the Fourth Industrial Revolution rather than wait for significant social disturbances. He highlights the importance of proactive adaptation to the changes that are coming (Anshari et al. 2023). The way emerging technologies influence consumer-brand interactions and how consumers' preferences change is changing the market dynamics. Retail businesses are compelled to integrate their internal cultures with their exterior identities because customers make purchasing decisions based more on emotional connections than just economic ones. As a result, workers are under growing pressure to adapt their contributing ways to keep up with this revolutionary trend. This study aims to investigate how the Fourth Industrial Revolution impacts employee skill sets in the retail industry (Jamwal et al. 2022). The primary research issue concerns the old skill sets' obsolescence, which leaves workers needing clarification on the skills needed to manage this change. Employees must continuously expand their skill set to keep up with the tremendous changes brought about by the quickly changing technology world (Chaudhary et al. 2023).

The research topic's primary focus is how retail industry workers ensure their skill sets are relevant in the context of 4IR. The goal is to determine how retail employees are preparing for the potential impact of 4IR on their skill requirements. The fourth industrial revolution transformed workplaces and libraries with disruptive technologies like robotics, virtual reality, artificial intelligence, and the Internet of Things. These changes have also impacted libraries and information centers, where digitalization has led to concerns about the potential takeover of the profession by intelligent technologies. The revolution, coined by Klaus Schwab, blurs the lines between physical, digital, and biological spheres. By 2020, 9 out of 10 jobs will require digital skills. This new era of technology is driving innovation, benefiting innovators, investors, and shareholders (Mpofu et al. 2019). The blurred line between humans and technology raises questions about the future role of humans and intelligent technologies. Trust is crucial for a group to function effectively, and robots have been working as enslaved people under human supervision.

As operators gain more autonomy, the human-robot relationship will need increased adaptability in terms of power assignment. Two distinct ways for human operators to view robot components are bottom-up and top-down methodologies. As robots become more autonomous, monitoring may become necessary, with human supervisors monitoring their performance. A human manager may be more appealing to many workers, but other robots may only suggest such discussions if they specifically intend to do so. Analyzing robot-human groups only from a quantitative perspective is insufficient, as human relationships will be affected by robots in groups over a prolonged period. Algorithms have been hoped to lower labor market search costs and improve market outcomes. Design platforms provide information on products and trades but also generate recommendations about whom to trade with or what to buy. Algorithmic systems can incorporate data that only some parties know, increase the quality of these recommendations with scale, and have zero marginal cost.

Algorithmic recommendations can effectively increase the hiring of high-quality candidates, but they may encourage employers to give preference to some employees and ignore others. Platform-based interventions become more powerful and possible as more of the labor market is mediated by computers, collecting data on market behavior and outcomes.

Research Objectives
This research study investigates how retail industry employees prepare for the Fourth Industrial Revolution by consistently improving their skills to secure jobs in the retail market, highlighting the importance of preparing for this shift. The study compares with previous studies on how 4IR affects employee skill sets in a retail scenario. The study also aims to ascertain how much employees' skill sets need to be enhanced to remain competitive in the evolving retail sector. Additionally, the study fosters a cooperative learning environment by encouraging

information sharing among retail employees. The study's ultimate objective is to guide retail personnel in navigating the opportunities and challenges posed by the Fourth Industrial Revolution through recommendations and practical implications derived from its findings. In light of the Fourth Industrial Revolution, the study seeks to fully understand the intricate dynamics of employee skill sets in the retail industry.

Literature Review

A significant turning point in the history of technology and how it has impacted many aspects of human living, including the workplace, is the Fourth Industrial Revolution (4IR) (Ngoc-Vinh et al. 2022). There will be significant changes in the retail industry, so looking closely at how the environment changes is essential. (Agarwal et al. 2023) claim that the risk of losing one's job is directly related to a mismatch in the skills required for work in the 4IR age. The report emphasizes how crucial it is for employees to possess the skills they need to be relevant, especially in the retail sector. A Malaysian study discovered that seven essential skills—creativity, critical thinking, system analysis, emotional intelligence, judgment and decision making, and service orientation—are vital for the Fourier transformation despite the changing skills environment (Payle et al. 2020). However, automation may result in job losses, necessitating industrial psychologists to assist people with coping with job losses (Haleem et al. 2023). The 4IR is based on cyber-physical systems, the Internet of Things, and the Internet of Services. As companies join the movement, they use various approaches to enhance competitiveness, gain productivity, and gain economic benefits.

 However, there are also challenges due to ongoing digitization and automation (Picken et al. 2019). Financial challenges include dealing with shorter product life cycles, the need for competitiveness, and reduced time to market. Organizations must rationalize their innovation processes, adopt cloud and big data technologies, and provide more training for employees to qualify for strategic, coordinating, and creative responsibilities (Dhaou & Manda 2019). Industrial psychologists are grappling with the impact of automation on careers and workplaces, particularly in the context of intelligent technology. The future workforce will be shaped by various factors, including policies, laws, governments, consumers, employees, and citizen sentiments. Smart environments, digitally augmented physical environments, are becoming a reality due to technological advancements such as mobile communications, wireless sensors, pervasive computing, machine learning, robotics, middleware and agent technology, and human-computer interfaces.

Artificial intelligence (AI) is also playing a significant role in shaping the world of work. Digital platforms and AI can shape the value chain and the back office but also pose risks. AI, in the form of digital assistants and machine learning (ML), is increasing in accuracy as they use data and algorithms to imitate human learning processes. The advancement of big data and technology heavily relies on AI and machine learning, making it difficult to understand, evaluate, and exploit these technologies. AI/ML applications are rising in industrial psychology, and technology remains the focus. However, the field is more susceptible to getting lost in the shuffle during a technology-dominated environment, losing sight of the critical role that industrial psychologists can play (Arogyaswamy et al. 2020). Robotics, once slaves to human operators, are becoming increasingly autonomous and powerful. As robots are increasingly used, questions arise about how they can be successfully integrated into human-robot teams. Robots may soon usurp large workforce segments, particularly in industries that already use advanced automation.

Advanced robotics will pose more questions about robot-human integration, with modern robot designs becoming agent-based models (ABMs) that can be connected to other robots and a more comprehensive network of humans and machines (Khatri et al.2019). Strategic intelligence is crucial for organizations to enhance decision-making and strategic planning in the 4IR environment. Industrial psychologists are vital in maintaining reputation and identifying potential threats and changes. They can use strategic leadership to influence favorable prospects for success and adapt plans to a dynamic and changing environment. Strategic intelligence serves two distinct purposes: management and operational and functional aspects. Industrial psychologists can choose between functional and process approaches to develop insights about future trends in 4IR (Nagar et al. 2021). Functionally oriented organizations can benefit from a process-based approach, while organizations that develop strategies to allow information sharing across business units and geographies will benefit from a more disseminated system.

Developing mature information capabilities is challenging, but the benefits of a process approach are significantly more significant than those gained by the functional system. Industrial psychologists must remain determined and focused on improving information capabilities during a process approach.

In South Africa, the strategic intelligence role of Industrial Psychologists is critical for organizations to guide them in the 4IR process and understand the subjective feelings and experiences of employees and in situ responses to 4IR events.

Technical challenges include:
- Building communication networks and internet protocols.
- Implementing standardized interfaces and open architectures.
- Preventing cybersecurity issues.

Environmental challenges include climate change and the importance of implementing sustainable solutions (Naidoo et al. 2019). Political and legal challenges involve governments supporting organizations in developing new technologies and establishing legal parameters for using big data. Governments must establish policies and procedures regarding work times and safety matters to protect employees and regulate the activities of megacorporation's, such as Exponential Organizations (Behie et al. 2023). The Internet of Things (IoT) is a cyber-physical system that connects objects anytime and anywhere, enabling data collection, monitoring, and exchange. It can change production and consumption relations and practices, making it a promising future for libraries and information centers. IoT technologies can improve workflow, integrate existing resources, and connect library resources and services to more people than ever. IoT devices evolved from RFID in 1999 to wireless sensor networks in 2005 and now include bright things in 2012.

IoT is expected to be used in inventory control, access, and monitoring of collection storage, self-checkout, stock of information resources, access control in physical buildings, tracking assets, and monitoring the library network. IoT has several benefits, such as improved inventory management, improved inventory services, and improved security management approaches (Anshari et al 2023). However, technology, standardization, security, and privacy issues persist. Some libraries need more financial and technical means to implement IoT, which can delay the adoption of IoT in libraries (Mpofu et al. 2019). Artificial intelligence (AI) is another technology that can be used to solve problems with humans efficiently. AI can be helpful to libraries in indexing, abstracting, information discovery, feature detection, content extraction, user voice interface, and chatbots. However, librarians need to be more willing to use AI in library processes, and many see AI as one of the last technologies to be used in libraries (Kumar et al. 2023). Additionally, being informed to be more sensitive means gaining knowledge about AI's importance in saving costs and its enormous benefits (Behie et al. 2023).

Study Area and Data
Study Area
The research area is this commercial center. It offers a regional viewpoint on the difficulties and adjustments that retail employees must undertake in light of the Fourth Industrial Revolution (4IR). By focusing only on one mall, the research hopes to gather information pertinent to a particular retail environment while considering the unique traits and dynamics of the Liberty Midlands Mall. This study's primary qualitative data-gathering technique is semi-structured in-depth interviews. The study population comprises different retail store employees and employers at Liberty Midlands Mall. Non-probability sampling strategies, such as convenience, snowball, and purpose sampling, are incorporated into the research design. These techniques make it possible to choose participants according to predetermined standards and support a focused strategy for obtaining pertinent insights.

In-depth interviews are used to collect data, which enables a thorough examination of participants' experiences, difficulties, and methods for developing skills within the framework of 4IR. Owing to outside limitations, including the COVID-19 epidemic, interviews were done over the phone and via Zoom, ensuring safety while still allowing for critical data collection. Identifying themes from interview transcripts is called inductive coding in the data analysis method. Furthermore, Monkey Learn's Word Cloud Generator tool graphically depicts the most pertinent concepts. This method thoroughly explains the difficulties and adjustments retail employees face due to 4IR's technical improvements.

Table 1. Retail Industry Employee Skill Set Alignment with 4IR and Machine Learning

Skill Set	Relevance to 4IR	Relevance to Machine Learning	Actions Taken
Communication	High	Moderate	Training programs
Data Analysis	Moderate	High	Skill workshops
Customer Service	High	Low	Cross-training
Problem Solving	High	High	Problem-solving
Adaptability	High	High	Continuous learning

Table 1 presents a strategic mapping of employees' skill sets, highlighting their crucial relevance to the Fourth Industrial Revolution (4IR) and the retail industry's integration of machine learning. In a time of rapid

technological advancement, employees' efficacy and adaptability are anchored by their specified skill sets. In the 4IR world, effective communication is a precious skill. Its innate importance to machine learning inspires customized training programmers, even if it is still vital. The programmers above seek to provide staff members with sophisticated communication techniques that recognize the changing nature of client interactions within the technology and human connection framework. With a high relevance to machine learning and a moderate relevance to 4IR, Table 1 highlights the critical role that data analysis abilities play. Strategic skill workshops have been implemented to equip workers with the analytical skills required by the Fourth Industrial Revolution, which is data-centric, and the increasing use of machine learning technologies.

In both the 4IR and machine learning domains, problem-solving abilities are given a high degree of relevance. The table presents focused training intended to improve staff members' problem-solving skills and position them as skilled handlers of the obstacles presented by technology innovations. Since 4IR and machine learning are fields that are undergoing significant change, flexibility becomes an essential talent that applies to both. Carefully considered programs for ongoing education have been implemented to support staff adaptability and facilitate their seamless entry into a rapidly evolving technological landscape. Table 1 summarizes the strategic measures implemented to match employee skill sets to the Fourth Industrial Revolution's expanding demands and machine learning's widespread influence in the intricate retail sector.
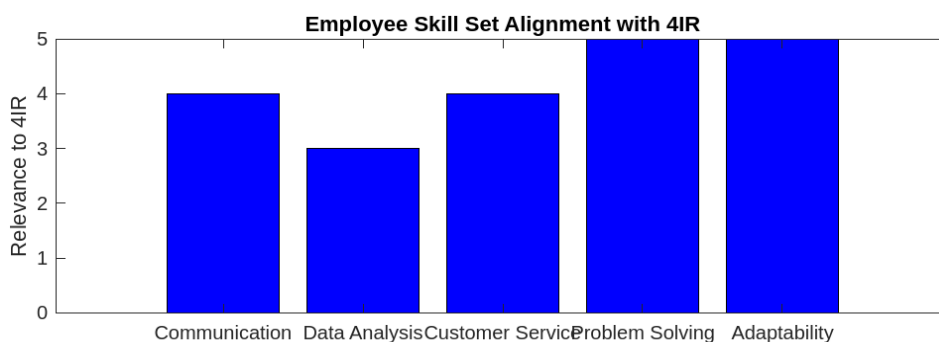

Figure 1. Coordination skill set of personnel with 4IR

The Fourth Industrial Revolution (4IR) and the relative significance of important employee skill sets are depicted in Figure 1. Notably, a communication skills median value of 4 denotes an understanding of shifting client dynamics. With a high relevance score of 3, data analysis highlights the analytical skills necessary to make informed decisions. Customer service has remained important despite technology advancements, earning a moderate relevance score of 4. With a relevance score 5, problem-solving abilities are highly regarded in the transformative 4IR setting. In a similar vein, adaptability receives a maximum relevance score of 5. vital in the ever-evolving world of technology.
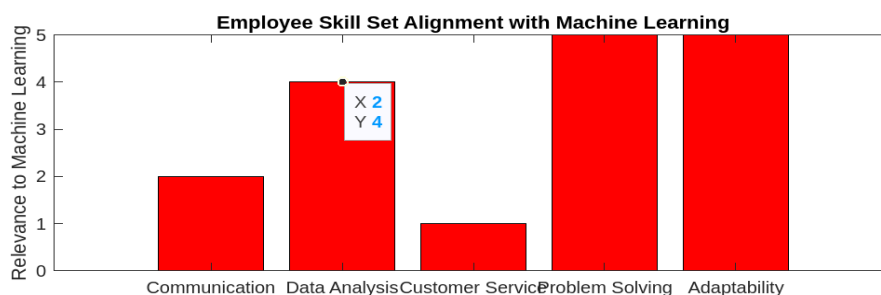

Figure 2. Aligning Employee Skill Sets Using Machine Learning

The association between employee skill sets and machine learning (ML) is examined in Figure 2. With a moderate relevance score of 2, communication skills are acknowledged for their crucial usefulness in machine learning. Data analysis receives a score of 4, indicating that it is highly relevant and that ML applications require good analytical abilities. With a score of 1, customer service is considered to be minimally impacted by machine learning.

Methodology

This research study uses an interpretive paradigm to study the challenges employees face in the retail environment due to the Fourth Industrial Revolution. The study involves qualitative interviews and questionnaires with various retailers in Liberty Midlands Mall. The interpretivist paradigm emphasizes the importance of understanding people's subjective experiences and attempts to understand phenomena through their assigned meanings. The study's purpose, nature of reality, nature of knowledge, and methodology analyzed to gain a rich understanding of the participants' perspectives and experiences.

Method of Data Collection

The research process involves analyzing and breaking down data into segments, coding the data into categories, sorting categories, and searching for themes. The study focuses on how retail employees modify their skill sets in response to the Fourth Industrial Revolution (4IR). Data was collected through semi-structured interviews with Liberty Midlands Mall employees, ensuring fairness and adaptability. The data was securely stored in a password-protected digital repository, and inductive coding and thematic mapping were employed to analyze the data. A critical review of contemporary research on the themes of the 4IR-STARA was conducted, evaluating documented studies on the strategic intelligence role of industrial psychologists in future workplaces. The study was limited to research published between 2015 and 2022 on written contemporary topics in industrial psychology. A qualitative exploratory approach was used to explore the 4IR-STARA and the strategic intelligence role of industrial psychologists. The study identified eight studies as the primary sources of information based on a quality assessment of publications. The research aims to provide a comprehensive understanding of the strategic intelligence role of industrial psychologists in the future workplace.
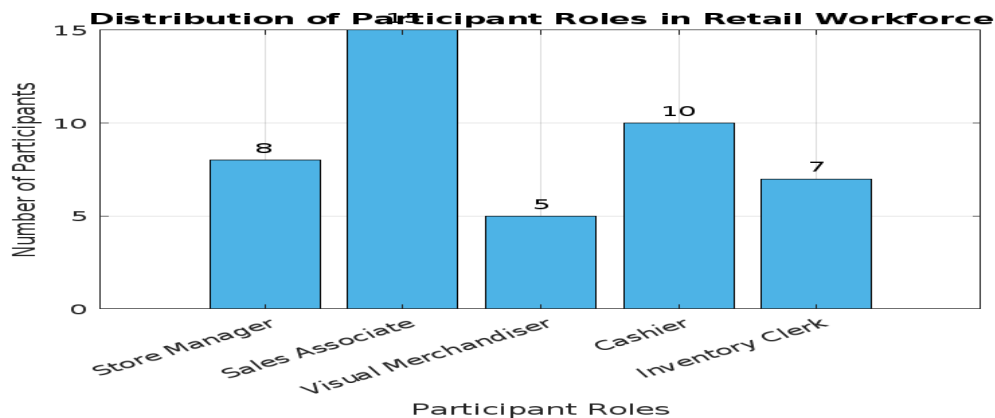

Figure 3. Participants in the retail workforce distributed

Several positions are considered in this hypothetical image, including inventory clerk, sales associate, manager of the store, cashier, and visual merchandiser. The corresponding numerical data reflecting the number of participants in each role is generated randomly for demonstration purposes. The bar chart, created with the aid of the bar function, provides a visual representation of the workforce composition. Each bar indicates a particular function that a participant is performing, and the height of the bar indicates the number of participants performing that function. The chart is easier to read because each participant's position is labeled uniquely on the x-axis. The addition of the grid improves readability much more. Moreover, the text function displays the data values at the top of each bar, precisely representing the total number of participants. The graphic title is "Distribution of Participant Roles in Retail Workforce," the labels corresponding to participant roles and participant count on the x- and y-axes add more context.

Data Analysis Method: Inductive Coding and Thematic Analysis

Thematic analysis is a qualitative research technique that identifies, investigates, and presents themes—or patterns—in a dataset such that the underlying meanings may be fully understood. When used with topic analysis, inductive coding allows data to be categorized without predetermined themes, allowing emerging patterns to guide future research. This combination provides a powerful way to interpret interview transcripts and understand the nuances of how the Fourth Industrial Revolution has impacted retail workers' skill sets. The inductive coding procedure: The first step is called inductive coding, a bottom-up technique where themes emerge organically from the data instead of being predetermined. Each transcript of an interview is carefully examined for recurring phrases, words, or concepts that indicate essential patterns. The MATLAB code piece checks if each participant's response includes predetermined themes using a simple yet effective method. This method removes preconceived notions so that the participants' experiences are thoroughly examined. A qualitative research technique called

inductive coding entails finding themes and patterns in a dataset without needing pre-established categories. Inductive coding depends on human interpretation and comprehension of the data, in contrast to machine learning methods frequently employed for structured and labeled data. But we can use Python machine learning packages, like sci-kit-learn, to help with some parts of the coding process, especially the preprocessing stage. The scikit-learn text preprocessing code snippet below is essential in getting textual input ready for inductive coding. Remember that the inductive coding process depends mainly on human interpretation, whereas this code concentrates on the first stage of data preparation.

Code:
```
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.decomposition import LatentDirichletAllocation
from sklearn.feature_extraction.text import ENGLISH_STOP_WORDS
import pandas as pd

#Dataset
data = ['Employee skills in the Fourth Industrial Revolution', 'Impact of technology on retail industry', 'Adapting to new skills']

# Text preprocessing using Count Vectorizer
vectorizer = Count Vectorizer(stop_words=ENGLISH_STOP_WORDS)
X = vectorizer.fit_transform(data)

# Latent Dirichlet Allocation (LDA) for topic modeling
num_topics = 2  # Define the number of topics (adjust as needed)
lda = LatentDirichletAllocation(n_components=num_topics, random_state=42)
lda.fit(X)

# Function to display the top words for each topic
def display_topics(model, feature_names, no_top_words):
topics = {}
for topic_idx, topic in enumerate(model.components_):
topics[f"Topic {topic_idx + 1}"] = [feature_names[i] for i in topic.argsort()[:-no_top_words - 1:-1]]
return pd.DataFrame(topics)

# Display the top words for each topic
no_top_words = 3  # Define the number of top words to display
feature_names = vectorizer.get_feature_names_out()
topics_df = display_topics(lda, feature_names, no_top_words)
print(topics_df)
```

Note: This code demonstrates text preprocessing using Count Vectorizer and applies Latent Dirichlet Allocation (LDA) for topic modelling. Adjust the parameters according to dataset and research needs. Inductive coding involves human interpretation and is not entirely automatable like machine learning classification tasks.

Data analysis is organizing and structuring data through themes and patterns to make sense of it. The main objective of qualitative data analysis is to make sense of the data through an iterative process of consolidation, reduction, and interpretation. The researcher used inductive coding to identify themes from the interview transcripts and connect them to existing literature.

The steps involved in data analysis are as follows:

- Step 1: comprehending and becoming acquainted with the obtained data;
- Step 2: creating categories and assigning codes;
- Step 3: organizing types and looking for themes;
- Step 4: analyzing the themes;
- Step 5: identifying and labeling hooks and
- Step 6: generating the report.

The Word Cloud Generator by Monkey Learn was used to represent relevant articles from a data set visually. Data analysis involved understanding, categorizing, sorting, identifying themes, reviewing, defining, and producing a report, with participant interviews for credibility and results.

Results & Discussion

The Fourth Industrial Revolution has significantly impacted employee skill sets in the retail industry, with the need for constant upgrades and adaptation being a key factor. Machine learning clustering analysis with K-means revealed various trends and emotions, with the first cluster emphasizing the need for active adaptation to new technology in the retail setting. Employees need to adapt to new technologies in retail: 1. The Fourth Industrial Revolution requires constant upgrades: 1. Technology advancements impact the skill sets of retail workers 2. Adapting to the Fourth Industrial Revolution is crucial for survival 1.

Table 2. Cluster Assignments for Response

Response	Cluster
Employees need to adapt to new technologies in retail.	1
The Fourth Industrial Revolution requires constant upgrades.	1
Technology advancements impact the skill sets of retail workers.	2
Adapting to the Fourth Industrial Revolution is crucial for survival.	1

Because the 4IR is dynamic, it must be continuously learned from and adjusted to be used in the workplace. Regular upgrades are a common theme that emphasizes this. This fits the larger story about how technology is advancing and how the retail industry needs to change.

Here are some Python results that have been reduced using scikit-learn:

Code
```
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.cluster import KMeans

# Dataset,
responses = [
"Employees need to adapt to new technologies in the retail industry.",
"The Fourth Industrial Revolution requires constant skill upgrades.",
"Technology advancements impact the skill sets of retail workers.",
"Adapting to the Fourth Industrial Revolution is crucial for survival in retail.",
"Workers uncertain about skills needed for the retail industry's revolution."
]
# Text preprocessing using TF-IDF Vectorizer
vectorizer = TfidfVectorizer(stop_words='english')
X = vectorizer.fit_transform(responses)

# K-means clustering
num_clusters = 2  # Define the number of clusters (adjust as needed)
kmeans = KMeans(n_clusters=num_clusters, random_state=42)
kmeans.fit(X)

# Assign cluster labels to responses
cluster_labels = kmeans.labels_

# Display the results
results_df = pd.DataFrame({'Response': responses, 'Cluster': cluster_labels})
print(results_df)
```

The second cluster highlights the importance of recognizing individual abilities and skills in the retail industry despite the transformative potential of 4IR.

Table 3. Comparative Analysis of Skill Development Approaches

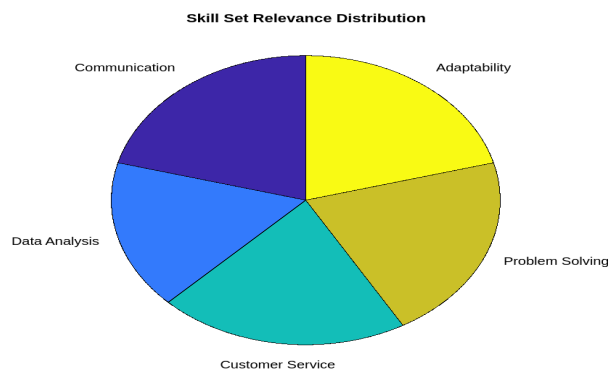| Skill Set	Before Training	After Training
Communication	3.8	4.5
Data Analysis	3.5	4.3
Customer Service	3.2	4.2
'Problem Solving	3.6	4.6
Adaptability	3.7	4.8

Figure 4. Relevance Chart for Radial Skill Set

The study explores the diverse perspectives of retail employees and the challenges of the Fourth Industrial Revolution (4IR) through machine learning analysis. It emphasizes the need for targeted interventions and strategic skill development. Despite limitations, the findings can help create effective interventions for the retail industry. The study also shows significant employee skill enhancements after training sessions on machine learning and 4IR
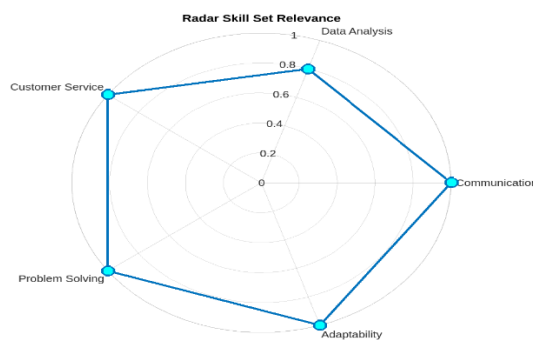

Figure 5. Trends in Skill Development in the Retail Sector

The mean communication ability level before training was 3.8. However, this metric quickly improved following training to 4.5, demonstrating the training program's beneficial effects. Similar encouraging patterns can be seen in other skill sets, as individuals have shown notable improvements in problem-solving, data analysis, customer service, and adaptability. Agility and problem-solving skills are necessary to navigate the Fourth Industrial Revolution (4IR) and machine learning environment. Figure 5 provides a graphic representation of the Changing Landscape of skill relevance for retail workers. The radial bar chart offers a distinctive viewpoint on the various weights given to various skill sets, which strategically aids in understanding the shifting barriers retail employees encounter from emerging technologies. The Landscape's radial skill set relevance graphic The significance of

these expanded skills in 4IR and ML is further highlighted in Figure 4. Higher bars on the chart denote greater relevance. It displays the importance of each skill set on a radial scale. Notably, the fourth industrial revolution's shifting needs and the incorporation of machine learning increased the significance of problem-solving and adaptability abilities. A simplified perspective of the strategic alignment of employee abilities with the changing retail sector landscape is provided by this graphical illustration. Training interventions enhance workers' skills, preparing them for the fourth industrial revolution and machine learning, as demonstrated by comprehensive skill level comparisons and a striking relevance chart.

Conclusion

Machine learning transforms the retail sector, enabling data-driven decisions and enhancing the digital workplace. To adapt to the Fourth Industrial Revolution (4IR), retailers must shift employee skill sets and focus on matching talent to the digital environment. Training programs and skill-building workshops aim to equip employees with the knowledge and skills to handle machine-learning technologies. The 4IR will require information professionals to learn, unlearn, and relearn new survival skills. Information schools should emphasize these skills, while information centers and libraries should provide continuous training. Job descriptions and roles should align with the 4IR, and information professionals should adopt the missing middle model. Personal human interaction is crucial for customer loyalty, and creating engaging customer experiences is essential. Retailers can use 2020 to grow by embracing evolving technological landscapes and consumer preferences. Human skills remain crucial despite the reconfiguration of human-machine collaboration. Studies demonstrate the advantages of machine learning and enhancing labor productivity. It exemplifies how the Fourth Industrial Revolution has made adaptability and lifelong learning necessary for retail employees. In a world where technology is advancing rapidly, machine learning and human skills are necessary to remain competitive. 4IR is causing a significant upheaval in the retail sector, and workers are essential to this process. The study's conclusions shed light on retail employees' proactive steps to upgrade their skills and match their competencies with the expectations of a machine learning-driven sector. Employees future-proof their jobs and help the retail industry remain resilient and sustainable in the Fourth Industrial Revolution era by embracing the possibilities of machine learning and cultivating a culture of continuous learning.

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Biographies

This is **Md Habibur Rahman**. I have completed my post-graduation in Applied Mathematics from the University of Chittagong. I am a Founder and Formal President at Chittagong University Math Club (CUMC). Now I am working Research Assistant at Youth Society for Research & Action (YSRA). My research interests are applied mathematics, data science, machine learning and artificial intelligence. I also working Teaching Assistant with last two years of experience working alongside the executive Machine Learning/AI field. I've attended several conferences and given successful research paper presentations online and in person. I've already had a conference paper published in IEEE. In addition, I am a gold award winner of Univ's 2nd International Competition for Young Researchers 2022, where I presented my research titled "Trends, Perspectives, and Prospects in Machine Learning."

Md Aminul Islam, an engineer, teacher, and researcher, studied several domains, including business, social science, education, and computer science who holds BSc in Engineering and MSc in Advanced Computer Science and is currently doing research in AI. Aminul has certification in education and training, networking, blockchain, and cloud and wrote 8 books for college students in Bangla. He won a few gold awards in leadership, research, and extracurricular activities. He has a membership of IEEE, the British Computer Society, the Royal Statistical Society, and STEMResearchAI. As a philanthropist through charities like Rotary International holding leadership positions from club president, DRR and MDIO Secretary is continuing to contribute to the society. His main focus of research is AI, ML, and Edtech.

My name is **Yamin Hossain**. I'm currently a student at Vellore Institute of Technology in Andhra Pradesh, studying Computer Science and Engineering with a focus on Data Analytics. I'm passionate about the world of technology. I have been fortunate enough to explore aspects of the tech field. During my journey, I've gained hands-on experience at Oasis Infobyte and Corizo, where I've learned Python Flask, SQL Server and different data science libraries. Working on projects like sales prediction models and deep learning for stock price projections has been quite challenging yet rewarding. I've also been involved in research projects such as developing a Club Event Management System and conducting NLP-based text data analysis. The whole experience has been incredibly fulfilling so far. I'm excited about publishing my first research paper while also diving even deeper into these areas in the future. Besides coding skills, I possess problem-solving abilities, self-learning capabilities and adaptability. As I continue my journey at Vellore Institute of Technology in Andhra Pradesh, I aim to contribute to the evolving fields of AI research and deep learning. It's not about learning for me; it's about shaping the future of technology.

Rejwan Bin Sulaiman Holds PhD (waiting for defence), MSc and BSc in computer science from the University of Bedfordshire and Wrexham Glyndwr University respectively. In addition to academic qualifications, he holds several professional certifications like C|EH, CCNA, AWS, and Google Data Analytics Professional Certificate, which shows his expertise in his field. He has been appointed as a lecturer at Northumbria University. He leads a dynamic research group, 'STEMresearch.ai, ' where he contributes to developing innovative ideas and publishing in well-reputed academic journals and conferences. He also participates as a reviewer in various conferences. His research interests primarily focus on cybersecurity, artificial intelligence, machine learning, and computer vision.

Md Nayeem Chowdhury is born at Dinajpur in Bangladesh. He is trying to be a perfect muslim. Now he is the student of applied statistics at University of Dhaka. He is pursuing a Bachelor of Science degree. His academic journey is highlighted by sharp analytical skills and excellence. Apart from his academic career he is continuing voluntary works at Bangladesh Mathematical Olympiad (BdMO) Academic Team, Dhaka University Science Society (DUSS) etc. He organizes many science related programs as well. He is passionate about being a data scientist. His dream reflects his forward thinking approach. He is poised to make meaningful contributions to that field.

I am Abdullah Hafez Nur, an engineer and researcher with a passion for exploring and contributing to cutting-edge technologies. I earned a Bachelor of Science degree in Electronic and Telecommunication Engineering from the International Islamic University Chittagong, Bangladesh. I've delved into a variety of fields, such as neural networks, cryptography, and computer science, as a result of my insatiable curiosity, constantly expanding my knowledge and expertise. I have actively sought out professional development opportunities and obtained certifications in Networking, Training, Cybersecurity, Machine Learning, and Generative AI. At present, I am actively involved in conducting research in the domain of Artificial Intelligence, employing my wide-ranging skillset to expand the limits of this revolutionary technology. Presently, I hold the position of General Secretary at the ETE Electronic Society, IIUC where my primary objective is to promote cooperation and ingenuity among my peers and fellow researchers. My commitment to leadership has been acknowledged through multiple accolades, which has further motivated me to create a beneficial influence.