Effective E-Learnıng Practıces by Machine Learning and Artificial Intelligence

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Summary

This is an extended research paper focusing on the applications of Machine Learing and Artificial Intelligence in virtual learning environment. The world is moving at a fast pace having the application of Machine Learning (ML) and Artificial Intelligence (AI) in all the major disciplines and the educational sector is also not untouched by its impact especially in an online learning environment. This paper attempts to elaborate on the benefits of ML and AI in E-Learning (EL) in general and explain how King Khalid University (KKU) EL Deanship is making the best of ML and AI in its practices. Also, researchers have focused on the future of ML and AI in any academic program. This research is descriptive in nature; results are based on qualitative analysis done through tools and techniques of EL applied in KKU as an example but the same modus operandi can be implemented by any institution in its EL platform. KKU is using Learning Management Services (LMS) for providing online learning practices and Blackboard (BB) for sharing online learning resources, therefore these tools are considered by the researchers for explaining the results of ML and AI.

Keywords:
Artificial Intelligence, Blackboard, E-Learning Deanship, Learning Management Services, Machine Learning

1. Introductıon

The introduction of ML and AI has filled the distances of communication [1]. EL is witnessing its growth as never before, from the Educational sector to the commercial environment, but without ML and AI this growth would have never been possible. ML and AI are sketching the future growth of EL by using the techniques of prediction, algorithms to develop more individual-centric EL practices. This paper attempts to answer the methods and processes to achieve this objective. As an example, KKU EL deanship is used to observe the role of ML and AI in EL growth. This paper has tried to answer the possibilities of changes in EL with more advancement in ML and AI. The paper is segmented into three parts; the first part presents the literature review where a description and introduction of EL in KKU is given specifically. Also, the general historic vision of EL is given along with the growth of ML and AI from past to present. The second part is the Discussion on various areas of ML and AI in general and in context to EL in KKU specifically as of educational sector that covers the definition of ML and AI, ML classification, benefits of ML and AI in EL, EL transformation due to ML and AI and ML application. All these areas are discussed with reference to KKU EL deanship. The last part provides the qualitative results on expected changes in EL in KKU after the application and determination of ML and AI [1, 2]. Besides above mentioned three parts a short note on predictive limitations is also given which is completely based on researchers' experiences with ML and AI in EL environment.

2. Literature Review

The EL Deanship (ELD) at King Khalid University was established in the year 1426 H (As per Arabic Calendar) as part of the continuous online learning in KKU. EL has tried to use the best of techniques in developing and improving its educational services. In a general context, preeminent examples of using ML and AI are in the development process of LMS for any educational system. From the introduction time, EL centers have been performing various researches and using trained IT staff to enhance education systems, develop online learning skills, and apply the best of online expertise in imparting knowledge [3, 4]. In the current scenario, EL deanship in KKU has launched many new online services to achieve a new level of success in the online education sector. KKU's vision for

EL is to take "KKU's human resource at the highest skills and empower them to fulfill their changing needs and aspirations through using embedded EL" [2, 3].

To meet these objectives EL in KKU has recently introduced Advanced Google Classroom, Mediasite for online streaming of lectures, etc. EL has also focused on advancing LMS for effective communication and feedback beyond the traditional learning environment [3]. Many external applications have also been developed focusing on education sharing through Google Classroom and other tools such as YouTube, Google Docs, Google Mail, Task Manager, and Google Analytics [3]. These are the focal tools of the development programs of EL in the extensive references. These applications have enabled all online users to share information at all levels for learning and teaching (L&T) purposes [4].

2.1 History of EL

Arthur Samuel was an American initiator in the field of PC gaming and AI, and in 1959 while working at IBM he introduced the concept of ML [4]. In the 1960s, Nilsson authored a book on Learning Machines, explaining the management systems of ML for design classification [24]. The enthusiasm for design and application of ML was identified in 1970 and 1973; Duda and Hart portrayed the same in their book "Pattern Classification [5]". As a logical undertaking, ML and AI have become very popular applications from past to present. Scholars, Scientists, Professionals, academicians all use this for machining the information. They use ML and AI for the application of representative strategies, named as "neural systems"; these are for the most important part of perceptrons [6]. Another application of ML and AI is Probabilistic thinking [6, 7] which is mostly utilized and mechanized in the clinical analysis by the medical practitioners [4].

The expression "EL" is not very old, it is introduced in 1999, initially employed at a CBT [4] systems seminar. As a synonym, many other expressions too are used like "online learning" and "virtual learning" for EL [4]. EL has taken extensive development over a period of time and has achieved a much deeper meaning in the 19th century [4].
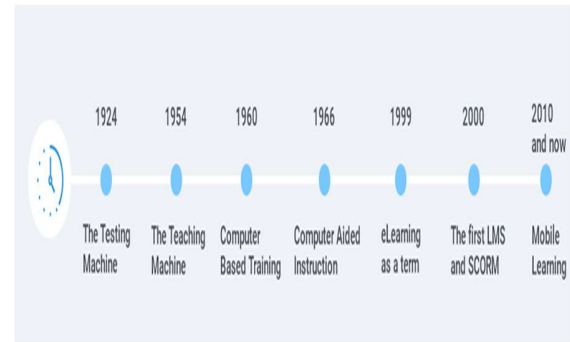

Figure. 1 History of EL [4]

ML and AI provide accentuation on a methodology that helps in expanding the sensible processing of information. In 1980, Probabilistic frameworks were beset by hypothetical and viable issues of information procurement and representation [7], and in the same year, master frameworks were developed to command and measure man-made intelligence [6]. Work on emblematic/information-based learning continued inside man-made intelligence, prompting inductive rationale programming. However, the more factual line of researches is outside the field and domain of AI appropriateness in design acknowledgment and data retrieval [8]. Neural systems exploration had been relinquished by simulated intelligence and software engineering around a similar time during the 80s. This line, as well, was preceded outside the man-made intelligence/CS field, called "connectionism", by the scientists from different orders including Hopfield, Rumelhart, and Hinton. Their fundamental achievements came in the mid-1980s with the reevaluation of backpropagation [9] which was another way to say "in the reverse spread of mistakes," defined as a calculation for administered learning of fake neural systems utilizing angle plunge. ML revamped as a different field, began to thrive during the 1990s. The field changed its objective from accomplishing AI to handling resolvable issues of a pragmatic sort. AI moved away from concentrated form to emblematic methodologies which were acquired from man-made intelligence, derived from strategies and models obtained from insights and 'likelihood theory' [8, 9]. AI likewise profited by the expanding accessibility of digitized data, and the capacity to disseminate it through the Web.

3. Discussion

3.1 Definition of ML and AI

ML is not a separate branch it has emerged from AI that includes algorithms for performing predictions and gives outcomes. The entire process depicts a type of pattern and then concludes learning extracted through data. Also, a parallel process runs where all novice information received, is first analyzed and used to predict the user's behavior. It is relevant to note here that LMS [11] is benefitted from this process as it provides a personalization outlook for the users.

3.2 Definition of ML and AI in KKU EL

EL in KKU has also utilized the significance of ML and AI in LMS, where student's online access of data is evaluated and aids in calculating the duration and which tool students have used while working on LMS in EL.
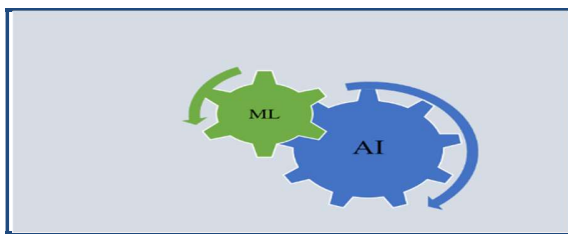

Figure. 2 ML as a subpart of AI [11]

In defining ML, two types of ML frameworks are identified: Proprietary and Open Source [11].
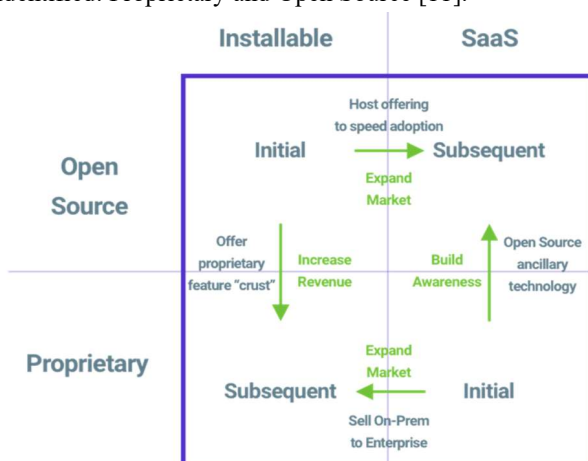

Figure. 3 ML Framework [11]

Proprietary and open-source are two types of examples of deep learning [12]. EL in KKU is using proprietary deep learning software more than open-source. EL in KKU is using different tools developed by Google for its performance such as tensor process units [12, 13] and other academies have a choice to implement proprietary or open-source as per their educational requirements.

3.3 ML Classifications for KKU EL

ML is respected to identify data of a user and give results in form of patterns. These patterns are given by ML using algorithms to forecast the effect. EL in KKU has successfully implanted ML's algorithm classification [13, 14] in LMS.
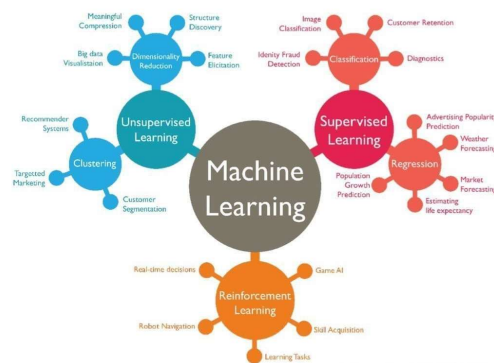

Figure. 4 ML Classification [14]

Figure 4, explains the classification of ML [11, 14], into three categories; Supervised, Unsupervised, and Reinforcement [2, 11]. EL in KKU is using all three applications in the development of various online tools and techniques in LMS services like category one is used by IT (Information Technology) specialists in developing a new interface for BB on LMS services where the IT Human Resource (HR) are predicting new data sets based on past data sets. For the second category EL in KKU is using a sub-set category known as "semi-supervised" [14], where IT HR tries to offer the system with accurate input and output relationship in building in any new LMS platform. To meet this objective EL deanship conducts extensive IT HR training. IT HR follows optimum methods of evaluating output sets in the

third category of ML in EL in KKU. This is an example of the process of learning from reward and errors.

3.4 The Benefits of ML and AI in KKU EL

EL in KKU [15, 16] is using the best of benefits provided by ML and AI for its' online learners and instructors. The focus is on the present and future of LMS practices. Mostly for new LMS [15] where idea is to confer predictive algorithms and robotic delivery of EL contents. Figure 5 gives the benefit of ML and AI in KKU EL in general.
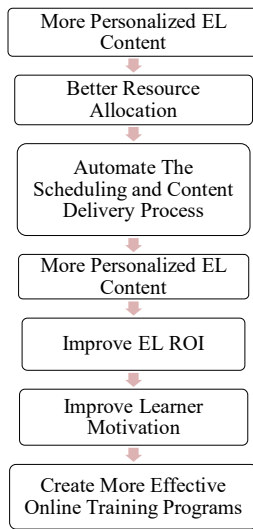

Figure. 5 Benefits of ML and AL in EL [16]

Researchers have discussed how EL in KKU is taking the benefits from ML and AI in its LMS practices. Table 2 gives a brief description of receiving benefits from ML and AI in LMS and other online platforms.

Table 1: Benefits of ML and AL in EL [15]

Adaptive Learning	Predictive Analytics
Increasing Efficiency	Personalized Learning
Learning Analytics	Accurately Grading Assignments

3.5 ML and AI are transforming the EL scenario in KKU

Consider a scenario where an online user can make EL substance and afterward let the framework deal with the more repetitive assignments, for example, surveying outlines and measurements to recognize concealed examples. KKU has imaged the scenario where IT HR prompt customized EL criticism and steer online students the correct way with no human intercession or automatically. ML and AI can computerize the off-camera work that requires a lot of time and assets [10] and that are how EL in KKU is benefitting in transformation and finally, AI-assisted the IT HR in encountering relevant errors in the LMS environment. ML and AI also help IT HR of El deanship in customizing online users' learning choices based on their previous usage, performance, and work requirements. Below given figure 6 provides a list of an application under ML and AI applied in EL in KKU. This includes Research Available Tech tool (RTT), Current Big Data Collection (BDC), ML's role in Online Training Strategy (MLOTS), and Future Game Plan for Online Learning (FGOL).
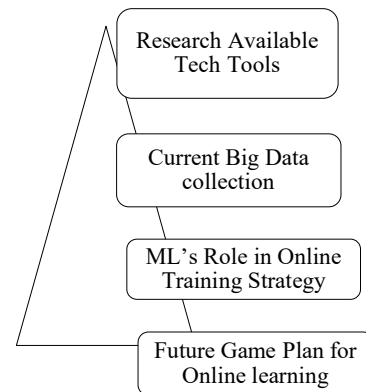

Figure. 6 ML and AI application of EL in KKU [18]

EL in KKU has assumed that ML and AI will certainly make a noticeable development in the future growth of EL. These applications have particularly given various advantages such as connecting individual online students to a group of other online users and finally to the wider remote associations. Researchers have identified the limitation in the scope of ML and AI. Results have not adequately proved the range of advantages and capacity of the assistance of using ML and AI.

4. Results

This research paper is based on a complete qualitative approach where IT HR and other online users such as online instructors, online students, and EL admin people were given interviewed. Based on their answers, a report has been prepared for explaining the benefits and applications of ML and AI in KKU EL. Also the report explains the transformation in KKU EL by ML and AI.

Facilitates More Personalized Learning: ML and AI focuses on the standard courses and lessons that students should study to meet course learing outcomes and be successful in the particular module. Advances in ML and AI have helped KKU EL in developing the course plan and check the progress. *Improve Teaching:* Innovative smart education software has helped KKU's teachers to improve their teaching skills and ease their efforts in L&T. ML and AI teaching software can identify areas where students are weak and focus on that area to improve also this method has reduced the paper work aiding in effective and environmental friendly use of resources.

Automates Basic Activities including Grading: School as well as college grading consumes a lot of time for teachers and student, with the help of ML and AI, EL proved immediate report on grades and statstics on preogress.

Makes Adaptive Learning Possible: ML and AI have introduced adaptive learning programs for the academy assits students to learn better and help students to know the importance on tough topics, repetition of lessons and due date for assignments.

Feedback for Students and Educators:
Apart from aiding the L&T for Instructors and students, ML and AI also provide feedback for users' pregoress and statistics. ML and AI facilitated the KKU instructors to know about the areas where students' grades are poor or need improvement.

New Way to Find and Use Information: ML and AL are growing and have introduced more tools for KKU EL like Google meet, Google classroom, BB ultra including some intetrating technologies such as Zoom or Mictrosoft teams. Now students and instructors have more options to interact and learn.

Reduces Trial and Error in EL: ML and AI, KKU is able to build the El system more reliebale and now can identify error reports more promptly. This feature has facilitiated the KKU EL in monitoring thestuents' grades, their attendance and assessments.

5. Conclusıon

ML and AI have facilitated the development of tools, techniques, and online services of EL in KKU. These services include LMS BB, Blackboard collaborates, KKUX, etc. IT HR of EL in KKU comprehended that ML and AI have helped in developing, designing, implementing tools and techniques helpful to educators and learners. Also, EL in KKU looks forward to applying ML algorithms and AI in the prediction of potential advantages in its services' development to conclude in meeting CLOs

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