MACHINE LEARNING

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Abstract:

Machine Learning is the art (and science) of enabling machines to learn things which are not explicitly programmed. It involves as much mathematics as much it involves computer science. Most often, people are put off by the sheer amount of mathematical equations and concepts in machine learning. The past year has been a great one for AI and Machine Learning. Many new high-impact applications of Machine Learning were discovered and brought to light, especially in healthcare, finance, speech recognition, augmented reality, and more complex 3D and video applications. In machine learning programming languages they are used python to SQL. In this paper we have discussed what is machine learning and its types and how does machine learning works and the key elements of ML and we have also explained machine learning methods which are using today and its process, applications ,advantages, disadvantages and top 7 programming languages and we discussed about the companies which uses machine learning.

Keywords: Machine learning (ML), Traditional Programming, ML algorithms.

INTRODUCTION:

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use in order to perform a specific task effectively without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of artificial intelligence. Machine learning algorithms build a mathematical model based on sample data, known as training data in order to make predictions or decisions without being explicitly programmed to perform the task. Machine learning algorithms are used in a wide variety of applications, such as email filtering, and computer vision, where it is infeasible to develop an algorithm of specific instructions for performing the task. Machine learning is closely related to computational statistics, which focuses on making predictions using computers. The study of mathematical optimization delivers methods, theory and application domains to the field of machine learning. Data mining is a field of study within machine learning, and focuses on exploratory data analysis through unsupervised learning. Machine learning and artificial intelligence share the same definition in the minds of many however, there are some distinct differences readers should recognize as well. In its application across business problems, machine learning is also referred to as predictive analytics.

Literature Survey:

Machine learning is a field of computer science which gives computers an ability to learn without being explicitly programmed. Machine learning is used in a variety of computational tasks where designing and programming explicit algorithms with good performance is not easy. Applications include email filtering, recognition of network intruders or malicious insiders working towards a data breach. One of the foundation objectives of machine learning is to train computers to utilize data to solve a specified problem. A good number of applications of machine learning like classifier training on email messages in order to differentiate between spam and non-spam messages, fraud detection etc. In this article we will focus on basics of machine learning, machine learning tasks and problems and various machine learning algorithms.

Machine Learning (ML) has evolved from the endeavour of few computer enthusiasts exploiting the possibility of computers learning to play games, and a part of Mathematics (Statistics) that seldom considered computational approaches, to an independent research discipline that has not only provided the necessary base for statistical-computational principles of learning procedures, but also has developed various algorithms that are regularly used for text interpretation, pattern recognition, and a many other commercial purposes and has led to a separate research interest in data mining to identify hidden regularities or irregularities in social data that growing by second. This paper focuses on explaining the concept and evolution of Machine Learning, some of the popular Machine Learning algorithms and tries to compare three most popular algorithms based on some basic notions. Sentiment140 dataset was used and performance of each algorithm in terms of training time, prediction time and accuracy of prediction have been documented and compared.

The Natural Language Processing (NLP) and machine learning techniques used for representation of information and what classification algorithms are suitable for identifying & classifying relevant medical information in short text. This paper is present healthcare diagnosis treatment & prevention of disease, illness, injury in human. The domain is automatically learn some task of healthcare information, medical management, Patient health information etc. The proposed technique can be integrated with any medical management

system to make better medical decision and in patient management system can automatically mining biomedical information from digital repositories.

What is Machine Learning?

Machine Learning is getting computers to program themselves. If programming is automation, then machine learning is automating the process of automation. writing software is the bottleneck, we don't have enough good developers. Let the data do the work instead of people. Machine learning is the way to make programming scalable.

- **Traditional Programming**: Data and program is run on the computer to produce the output.
- **Machine Learning**: Data and output is run on the computer to create a program. This program can be used in traditional programming.

Machine learning is like farming or gardening. Seeds is the algorithms, nutrients is the data, the gardner is you and plants is the programs.
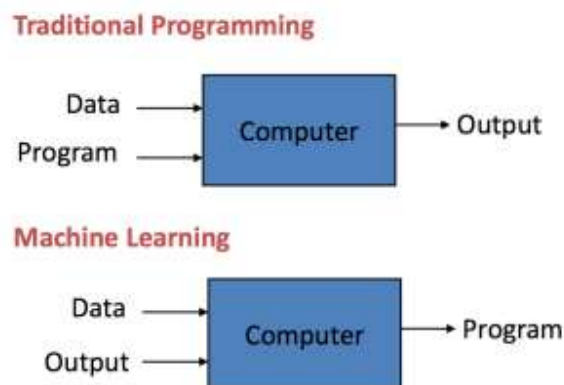
Traditional Programming vs Machine Learning

Evolution of Machine Learning:

Today, machine learning is different from what it used to be in the past, due to the emergence of advanced computing technologies. Initially, it had gained momentum due to pattern recognition and the fact that computers did not have to be programed to execute certain tasks to learn. Many researchers who were interested in Artificial Intelligence (AI) investigated this area further to find out whether computers could really learn from data or not.

The focus here is on iterative learning. Machines begin to adapt to new data that they are exposed to, over a period. Based on the patterns and computations that are previously created, machines learn to repeat decisions made in the past, in similar situations. This aspect of machines' ability to learn from the existing patterns, is now gaining huge momentum.

Today, people are sitting up and taking notice of the fact that machines are now able to apply complicated mathematical calculations to areas, such as big data, at a much faster rate. Consider Google Car for instance, which is primarily built on the crux of machine learning. Another important use of machine learning can be found in regular recommendations that are rolled out by companies like Netflix and Amazon - an example of machine learning in everyday life. Next, ML can also be combined with linguistic rules creation. This application is implemented by Twitter, where you will know what customers say about you. And not to forget, machine learning is significantly being used to detect fraud in various industry sectors.

How Does Machine Learning Work?

To get the maximum value from big data, businesses must know exactly how to pair the right algorithm with a particular tool or process and build machine learning models based on iterative learning processes. Some of the key machines learning algorithms are

- Random forests
- Neural networks
- Discovery of sequence and associations
- Decision trees
- Mapping of nearest neighbor

- Supporting vector machines
- Boosting and bagging gradient
- Self organizing maps
- Multivariate adaptive regression
- SEO
- Analysis of principal components

As mentioned above, the secret to successfully harnessing the applications of ML lies in not just knowing the algorithms, but in pairing them accurately with the right tools and processes, which include

- Data exploration followed by visualization of model results
- Overall data quality and management
- Easy model deployment to quickly get reliable and repeatable results
- Developing graphical user interface for creating process flows and building models
- Comparing various machine learning models and identifying the best
- Identify best performers through automated ensemble model evaluation
- Automated data-to-decision process

Why Should You Know About Machine Learning?

The days are gone when programmers would tell a machine how to solve a problem at hand. We are in the era of machine learning where machines are left to solve problems, on their own, by identifying the patterns in each data set. Analyzing hidden trends and patterns makes it easy to predict future problems and prevent them from occurring.

A machine learning algorithm usually follows a certain type of data and then uses the patterns hidden in that data to answer more questions. For example showing a computer a series of photographs, some of which say that "this is a horse" and some of which say "this is not a horse." After this exercise, if you show some more photographs to the same computer, it will be on a mission to identify which of those photographs are of a horse and which of those are not that of a horse. Every correct and incorrect guess of the computer is added to its memory, which makes it smarter in the longer run and enriches its learning over a period.

Key Elements of Machine Learning:

There are tens of thousands of machine learning algorithms and hundreds of new algorithms are developed every year.

Every machine learning algorithm has three components:

- **Representation**: how to represent knowledge. Examples include decision trees, sets of rules, instances, graphical models, neural networks, support vector machines, model ensembles and others.
- **Evaluation**: the way to evaluate candidate programs (hypotheses). Examples include accuracy, prediction and recall, squared error, likelihood, posterior probability, cost, margin, entropy k-L divergence and others.
- **Optimization**: the way candidate programs are generated known as the search process. For example combinatorial optimization, convex optimization, constrained optimization.

Machine Learning Methods which are using today

Although supervised and unsupervised learning are two of the most widely accepted machine learning methods by businesses today, there are various other machine learning techniques. Following is an overview of some of the most accepted ML methods
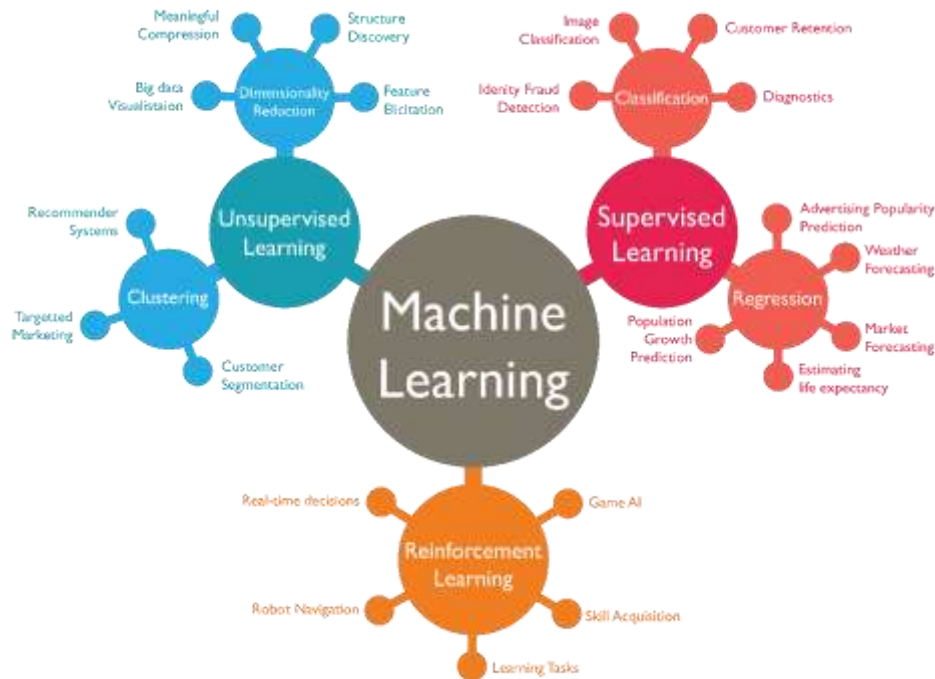
Supervised Learning

These algorithms are trained using labeled examples, in different scenarios, as an input where the desired outcome is already known. An equipment, for instance, could have data points such as "F" and "R" where "F" represents "failed" and "R" represents "runs".

A learning algorithm will receive a set of input instructions along with the corresponding accurate outcomes. The learning algorithm will then compare the actual outcome with the accurate outcome and flag an error, if there is any discrepancy. Using different methods, such as regression, classification, gradient boosting, and prediction, supervised learning uses different patterns to proactively predict the values of a label on extra unlabeled data. This method is commonly used in areas where historical data is used to predict events that are likely to occur in the future. For instance, anticipate when a credit card transaction is likely to be fraudulent or predict which insurance customers are likely to file their claims.

Unsupervised Learning

This method of ML finds its application in areas were data has no historical labels. Here, the system will not be provided with the "right answer" and the algorithm should identify what is being shown. The main aim here is to analyze the data and identify a pattern and structure within the available data set. Transactional data serves as a good source of data set for unsupervised learning.

For instance, this type of learning identifies customer segments with similar attributes and then lets the business to treat them similarly in marketing campaigns. Similarly, it can also identify attributes that differentiate customer segments from one another. Either ways, it is about identifying a similar structure in the available data set. Besides, these algorithms can also identify outliers in the available data sets.

Some of the widely used techniques of unsupervised learning are -

- k-means clustering
- self-organizing maps
- value decomposition
- mapping of nearest neighbor

Semi-supervised Learning

This kind of learning is used and applied to the same kind of scenarios where supervised learning is applicable. However, one must note that this technique uses both unlabeled and labeled data for training. Ideally, a small set of labeled data, along with a large volume of unlabeled data is used, as it takes less time, money and efforts to acquire unlabeled data. This type of machine learning is often used with methods, such as regression, classification and prediction. Companies that usually find it challenging to meet the high costs associated with labeled training process opt for semi-supervised learning.

Reinforcement Learning

This is mainly used in navigation, robotics and gaming. Actions that yield the best rewards are identified by algorithms that use trial and error methods. There are three major components in reinforcement learning, namely, the agent, the actions and the environment. The agent in this case is the decision maker, the actions are what an agent does, and the environment is anything that an agent interacts with. The main aim in this kind of learning is to select the actions that maximize the reward, within a specified time. By following a good policy, the agent can achieve the goal faster.

Hence, the primary idea of reinforcement learning is to identify the best policy or the method that helps businesses in achieving the goals faster. While humans can create a few good models in a week, machine learning is capable of developing thousands of such models in a week.
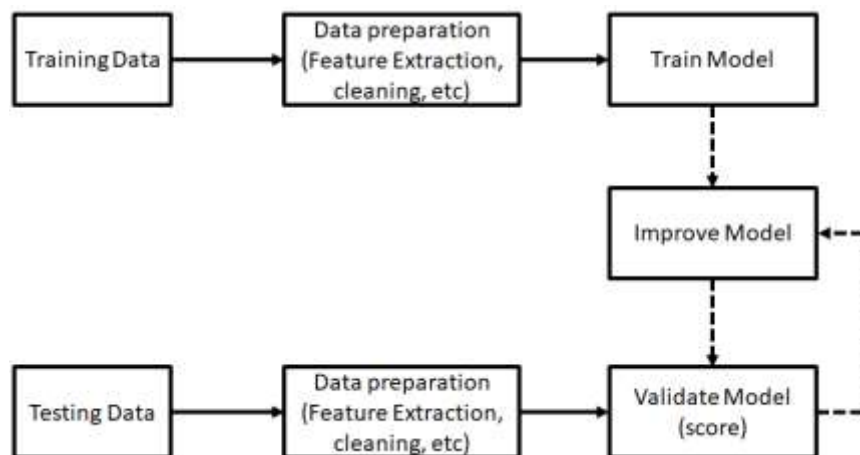
The machine learning process

Setting up an architecture for machine learning systems and applications requires a good insight in the various processes that play a crucial role. So to develop a good architecture you should have a solid insight in:

- The business process in which your machine learning system or application is used.
- The way humans interact or act (or not) with the machine learning system.
- The development and maintenance process needed for the machine learning system.
- Crucial quality aspects, e.g. security, privacy and safety aspects.

In its core a machine learning process exist of a number of typical steps. These steps are:

- Determine the problem you want to solve using machine learning technology
- Search and collect training data for your machine learning development process.
- Select a machine learning model
- Prepare the collected data to train the machine learning model
- Test your machine learning system using test data
- Validate and improve the machine learning model. Most of the time you will need to search for more training data within this iterative loop.

Uses of Machine Learning:

1. **Data Security**

    Malware is a huge and growing problem. In 2014, Kaspersky Lab said it had detected 325,000 new malware files every day. But, institutional intelligence company Deep Instinct says that each piece of new malware tends to have almost the same code as previous versions only between 2 and 10% of the files change from iteration to iteration. Their learning model has no problem with the 2–10% variations, and can predict which files are malware with great accuracy. In other situations, machine learning algorithms can look for patterns in how data in the cloud is accessed, and report anomalies that could predict security breaches.

2. **Personal Security**

    If you've flown on an airplane or attended a big public event lately, you almost certainly had to wait in long security screening lines. But machine learning is proving that it can be an asset to help eliminate false alarms and spot things human screeners might miss in security screenings at airports, stadiums, concerts, and other venues. That can speed up the process significantly and ensure safer events.

3. **Financial Trading**

    Many people are eager to be able to predict what the stock markets will do on any given day — for obvious reasons. But machine learning algorithms are getting closer all the time. Many prestigious trading firms use proprietary systems to predict and execute trades at high speeds and high volume. Many of these rely on probabilities, but even a trade with a relatively low probability, at a high enough volume or speed, can turn huge profits for the firms. And humans can't possibly compete with machines when it comes to consuming vast quantities of data or the speed with which they can execute a trade.

4. **Healthcare**

    Machine learning algorithms can process more information and spot more patterns than their human counterparts. One study used computer assisted diagnosis (CAD) when to review the early mammography scans of women who later developed breast cancer, and the computer spotted 52% of the cancers as much as a year before the women were officially diagnosed. Additionally, machine learning can be used to understand risk factors for disease in large populations. The company Medecision developed an algorithm that was able to identify eight variables to predict avoidable hospitalizations in diabetes patients.

5. **Marketing Personalization**

    The more you can understand about your customers, the better you can serve them, and the more you will sell. That's the foundation behind marketing personalization. Perhaps you've had the experience in which you visit an online store and look at a product but don't buy it and then see digital ads across the web for that *exact* product for days afterward. That kind of marketing personalization is just the tip of the iceberg. Companies can personalize which emails

    a customer receives, which direct mailings or coupons, which offers they see, which products show up as "recommended" and so on, all designed to lead the consumer more reliably towards a sale.

6. **Fraud Detection**

    Machine learning is getting better and better at spotting potential cases of fraud across many different fields. PayPal, for example, is using machine learning to fight money laundering. The company has tools that compare millions of transactions and can precisely distinguish between legitimate and fraudulent transactions between buyers and sellers.

7. **Recommendations**

    You're probably familiar with this use if you use services like Amazon or Netflix. Intelligent machine learning algorithms analyze your activity and compare it to the millions of other users to determine what you might like to buy or binge watch next. These recommendations are getting smarter all the time, recognizing, for example, that you might purchase certain things as gifts (and not want the item yourself) or that there might be different family members who have different TV preferences.

8. **Online Search**

Perhaps the most famous use of machine learning, Google and its competitors are constantly improving what the search engine understands. Every time you execute a search on Google, the program watches how you respond to the results. If you click the top result and stay on that web page, we can assume you got the information you were looking for and the search was a success. If, on the other hand, you click to the second page of results, or type in a new search string without clicking any of the results, we can surmise that the search engine didn't serve up the results you wanted and the program can learn from that mistake to deliver a better result in the future.

9. **Natural Language Processing (NLP)**

NLP is being used in all sorts of exciting applications across disciplines. Machine learning algorithms with natural language can stand in for customer service agents and more quickly route customers to the information they need. It's being used to translate obscure legalese in contracts into plain language and help attorneys sort through large volumes of information to prepare for a case.

10. **Smart Cars**

IBM recently surveyed top auto executives, and 74% expected that we would see smart cars on the road by 2025. A smart car would not only integrate into the Internet of Things, but also learn about its owner and its environment. It might adjust the internal settings — temperature, audio, seat position, etc. — automatically based on the driver, report and even fix problems itself, drive itself, and offer real time advice about traffic and road conditions.

Applications of Machine Learning:

- **Web search:** ranking page based on what you are most likely to click on.
- **Computational biology:** rational design drugs in the computer based on past experiments.
- **Finance:** decide who to send what credit card offers to. Evaluation of risk on credit offers. How to decide where to invest money.
- **E-commerce:** Predicting customer churn. Whether or not a transaction is fraudulent.
- **Space exploration:** space probes and radio astronomy.
- **Robotics**: how to handle uncertainty in new environments. Autonomous. Self-driving car.
- **Information extraction:** Ask questions over databases across the web.
- **Social networks**: Data on relationships and preferences. Machine learning to extract value from data.
- **Debugging:** Use in computer science problems like debugging. Labor intensive process. Could suggest where the bug could be.

Advantages of Machine learning:

✓ **Easily identifies trends and patterns**

Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon, it serves to understand the browsing behaviors and purchase histories of its users to help cater to the right products, deals, and reminders relevant to them. It uses the results to reveal relevant advertisements to them.

✓ **No human intervention needed (automation)**

With ML, you don't need to babysit your project every step of the way. Since it means giving machines the ability to learn, it lets them make predictions and also improve the algorithms on their own. A common example of this is anti-virus softwares; they learn to filter new threats as they are recognized. ML is also good at recognizing spam.

✓ **Continuous Improvement**

As **ML algorithms** gain experience, they keep improving in accuracy and efficiency. This lets them make better decisions. Say you need to make a weather forecast model. As the amount of data you have keeps growing, your algorithms learn to make more accurate predictions faster.

✓ **Handling multi-dimensional and multi-variety data**

Machine Learning algorithms are good at handling data that are multi-dimensional and multi-variety, and they can do this in dynamic or uncertain environments.

✓ **Wide Applications**

You could be an e-tailer or a healthcare provider and make ML work for you. Where it does apply, it holds the capability to help deliver a much more personal experience to customers while also targeting the right customers.

Disadvantages of Machine Learning:

✓ **Data Acquisition**

Machine Learning requires massive data sets to train on, and these should be inclusive/unbiased, and of good quality. There can also be times where they must wait for new data to be generated.

✓ **Time and Resources**

ML needs enough time to let the algorithms learn and develop enough to fulfill their purpose with a considerable amount of accuracy and relevancy. It also needs massive resources to function. This can mean additional requirements of computer power for you.

✓ **Interpretation of Results**

Another major challenge is the ability to accurately interpret results generated by the algorithms. You must also carefully choose the algorithms for your purpose.

✓ **High error-susceptibility**

Machine Learning is autonomous but highly susceptible to errors. Suppose you train an algorithm with data sets small enough to not be inclusive. You end up with biased predictions coming from a biased training set. This leads to irrelevant advertisements being displayed to customers. In the case of ML, such blunders can set off a chain of errors that can go undetected for long periods of time. And when they do get noticed, it takes quite some time to recognize the source of the issue, and even longer to correct it.

Top 7 programming languages that are used in Machine Learning:

1. **Python Machine Learning**

Machine learning scientists prefer Python over other languages like Java as it is better suited for tasks like sentiment analysis and data mining. Python is hugely popular even among programmers – this is no secret. It is arguably the best programming language at the moment. It's not surprising then that even machine learning professionals like this language.
Python is extensive. And, it is easily adaptable to the tasks on hand as a general-purpose language. Hence, it is highly convenient. App developers prefer this language especially.Developers

of Instagram and Pinterest used Python to realize their vision. Python is accurate and precise. It is efficient and convenient. These reasons make Python a top machine learning language.

2. **Machine learning with R**

R is a graphic-based machine learning language for statistical computing. It is used in data science for modelling and uncovering hidden patterns in voluminous data. It is a functional programming language unlike Python which is object-oriented. Data scientists at Facebook, Google, etc., use R for a variety of purposes. It is useful in exploring and understanding data. Moreover, it has several machine learning algorithms. R is better than Python at data analysis and statistical tasks as it was designed specifically for this purpose.

3. **Java Machine Learning**

      Java is generally used with Big Data tools like MapR and Kafka and several data management programs. Although Python and R are more popular, Java is established and manages to stay relevant with updates.

      The newest version – Java 11 – is out. It potentially has enough to offer aspiring machine learning experts for them to learn it.

4. **MATLAB for Machine Learning**

      Despite being a propriety language, which requires you to purchase a license for use (Python and R are open-source and free), Matlab has over a million users. It is a popular numerical computing language for professionals from engineering, economics and related backgrounds as it is rooted in mathematics. It also lays a solid foundation for you to learn Python as it is rooted in C, C++ and Java.

5. **Scala for Machine Learning**

      Scala is increasingly used in data science. According to one survey, this machine learning language has seen an increase of 10% in usage every year. This is hardly surprising as Scala is a general-purpose language, which supports functional and object-oriented programming. It is scalable.

      It runs on the Java Virtual Machine (JVM) but can compete with both Java and Python. Scala is useful in writing apps and compiling web scripts.

6. **C**

      C is one of the oldest and popular languages. It is the "mother" of languages like C++, Java, Java Script, etc. C is great for building predictive models and is a machine learning language you should consider learning.

7. **SQL**

      It is popular among data analysts and data scientists because it can easily compute data from NOSQL and advanced databases.

      SQL is a good resource to have for the ETL (extract, transform, load) process.

The Best Machine Learning Language

      To sum up, Python is arguably the best programming language for machine learning, as it is a general-purpose language that is suited for a variety of machine learning tasks. R is better suited for data analysis and statistical tasks as it is specifically designed for statistical computing.

      Java and C are popular, established machine learning programming languages that are always good to know. Matlab is great because it is rooted in mathematics. SQL is useful for querying large data sets.

      Scala is another general-purpose machine learning language that potentially has a lot to offer for aspiring machine learning engineers or anyone taking a machine learning course.

Machine Learning Using Companies:

1. Yelp – Image Curation at Scale

      Few things compare to trying out a new restaurant then going online to complain about it afterwards. This is among the many reasons why Yelp is so popular (and useful).

      While Yelp might not seem to be a tech company at first glance, Yelp is leveraging machine learning to improve users' experience.this is why Yelp turned to machine learning a couple of years ago when it first implemented its picture classification technology. **Yelp's machine learning algorithms help the company's human staff to compile, categorize, and label images more efficiently** – no small feat when you're dealing with tens of millions of photos.

2. Pinterest – Improved Content Discovery

      Whether you're a hardcore pinner or have never used the site before, Pinterest occupies a curious place in the social media ecosystem. Since Pinterest's primary function is to curate existing content, it makes sense that investing in technologies that can make this process more effective would be a priority and that's definitely the case at Pinterest.

In 2015, Pinterest acquired Kosei, a machine learning company that specialized in the commercial applications of machine learning tech (specifically, content discovery and recommendation algorithms).

Today, machine learning touches virtually every aspect of Pinterest's business operations, from spam moderation and content discovery to advertising monetization and reducing churn of email newsletter subscribers.

3. Facebook – Chatbot Army

Facebook's Messenger service is still a little contentious (people have very *s*trong feelings about messaging apps, it seems), it's one of the most exciting aspects of the world's largest social media platform. That's because Messenger has become something of an experimental testing laboratory for chatbots.

Any developer can create and submit a chatbot for inclusion in Facebook Messenger. This means that companies with a strong emphasis on customer service and retention can leverage chatbots, even if they're a tiny startup with limited engineering resources.

Of course, that's not the only application of machine learning that Facebook is interested in. **AI applications are being used at Facebook to filter out spam and poor-quality content**, and the company is also researching computer vision algorithms that can "read" images to visually impaired people.

4. Twitter – Curated Timelines

Twitter has been at the center of numerous controversies of late (not least of which were the much-derided decisions to round out everyone's avatars and changes to the way people are tagged in @ replies), but one of the more contentious changes we've seen on Twitter was the move toward an algorithmic feed.

Whether you prefer to have Twitter show you "the best tweets first" (whatever that means) or as a reasonably chronological timeline, these changes are being driven by Twitter's machine learning technology. **Twitter's AI evaluates each tweet in real time and "scores" them according to various metrics**.

Ultimately, Twitter's algorithms then display tweets that are likely to drive the most engagement. This is determined on an individual basis; **Twitter's machine learning tech makes those decisions based on your individual preferences**, resulting in the algorithmically curated feeds, which kinda suck if we're being completely honest.

5. Google – Neural Networks and 'Machines That Dream'

These days, it's probably easier to list areas of scientific R&D that Google or, rather, parent company Alphabet – isn't working on, rather than trying to summarize Google's technological ambition.

Needless to say, Google has been very busy in recent years, having diversified into such fields as anti-aging technology, medical devices, and – perhaps most exciting for tech nerds – neural networks.

The most visible developments in Google's neural network research has been **the DeepMind network, the "machine that dreams."** It's the same network that produced those psychedelic images everybody was talking about a while back.

According to Google, the company is researching "virtually all aspects of machine learning," which will lead to exciting developments in what Google calls "classical algorithms" as well as other applications including natural language processing, speech translation, and search ranking and prediction systems.

8. HubSpot – Smarter Sales

Anyone who is familiar with HubSpot probably already knows that the company has long been an early adopter of emerging technologies, and the company proved this again earlier this month when it announced the acquisition of machine learning firm Kemvi.
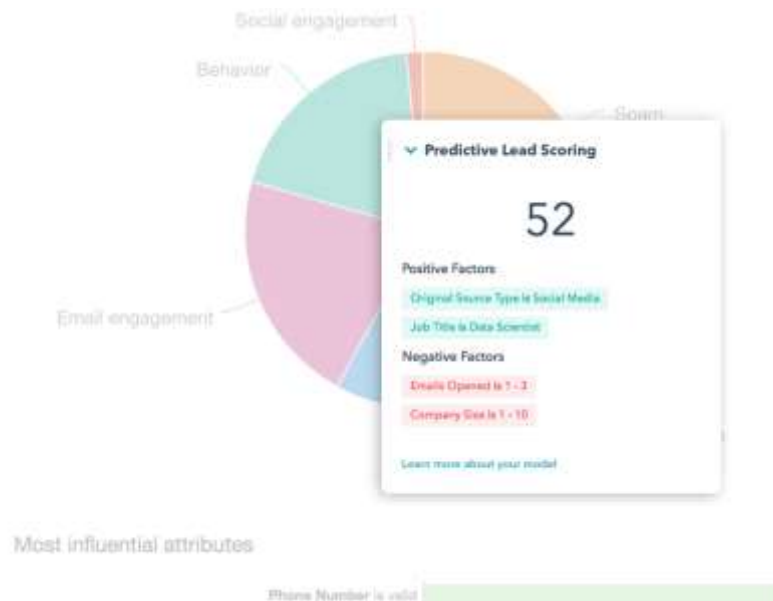
Predictive lead scoring is just one of the many potential applications of AI and machine learning. HubSpot plans to use Kemvi's technology in a range of applications – most notably, integrating Kemvi's DeepGraph machine learning and natural language processing tech in its internal content management system. This, according to HubSpot's Chief Strategy Officer Bradford Coffey, **will allow HubSpot to better identify "trigger events"** – changes to a company's structure, management, or anything else that affects day-to-day operations – to allow HubSpot to more effectively pitch prospective clients and serve existing customers.

9. IBM – Better Healthcare

The inclusion of IBM might seem a little strange, given that IBM is one of the largest and oldest of the legacy technology companies, but IBM has managed to transition from older business models to newer revenue streams remarkably well. None of IBM's products demonstrate this better than its renowned AI, Watson.

An example of how IBM's Watson can be used to test and validate self-learning behavioral modelsWatson may be a Jeopardy! champion, but it boasts a considerably more impressive track record than besting human contestants in televised game shows. **Watson has been deployed in several hospitals and medical centers in recent years**, where it demonstrated its aptitude for making highly accurate recommendations in the treatment of certain types of cancers.

Watson also shows significant potential in the retail sector, where it could be used as an assistant to help shoppers, as well as the hospitality industry. As such, IBM is now offering its Watson machine learning technology on a license basis – one of the first examples of an AI application being packaged in such a manner.

Conclusion:

Machine Learning is a technique of training machines to perform the activities a human brain can do, albeit bit faster and better than an average human-being. Today we have seen that the machines can beat human champions in games such as Chess, AlphaGO, which are considered very complex. You have seen that machines can be trained to perform human activities in several areas and can aid humans in living better lives. Machine Learning can be a Supervised or Unsupervised. If you have lesser amount of data and clearly labelled data for training, opt for Supervised Learning. Unsupervised Learning would generally give better performance and results for large data sets. If you have a huge data set easily available, go for deep learning techniques. You also have learned Reinforcement Learning and Deep Reinforcement Learning. You now know what Neural Networks are, their applications and limitations.

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