

APPS THAT LEARN: MACHINE LEARNING





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fact, it's a very good thing, particularly for your business.

Machine learning has gone through a number of different meanings over the years. Today, it's more about software and apps than about actual machines. It's about how the applications you interact with every day learn more about you, and about the world in which you live, in order to provide better service, a better usage experience, or greater customization.

IBM Research summed it up very well – “Machine learning will enable cognitive systems to learn, reason and engage with us in a more natural and personalized way. These systems will get smarter and more customized through interactions with data, devices and people. They will help us take on what may have been seen as unsolvable problems by using all the information that surrounds us and bringing the right insight or suggestion to our fingertips right when it's most needed.”

With that being said, machine learning isn't always a good thing. If applied incorrectly in an application, it can leave users wanting. It

Introduction

“Machine learning” – the phrase itself sounds like something from a William Gibson novel, perhaps *Neuromancer*. There are also other connotations that bring to mind sci-fi memes like SkyNet, or maybe Hal from *2001: A Space Odyssey*. Despite those references, machine learning is not a negative thing. In

can even result in a less than enjoyable experience overall, causing user defection to other, less intrusive or more accurate apps.

Real World Examples of Machine Learning Today

Not convinced that machine learning is actually “a thing” today? You need to look no farther than your own smartphone for proof that not only is it out there, but it’s being used all the time by people just like you. In this section, we’ll discuss several real world examples of apps that learn, as well as their benefits and drawbacks.

Siri, Cortana and Google Now

We’ll start with some of the most obvious learning apps out there. Siri, Cortana and Google Now are all personal assistants – apps that are designed to make our lives easier by not only fulfilling our needs at the moment, but by being able to anticipate them in many instances. That means they need to learn more about us. Yes, these apps actually do learn.

One aspect of this is speech recognition software. All three use it (with varying degrees of success). As you use the app, it becomes better and better able to understand what you’re saying. It also forms connections between your words and the actions you have it perform, and can even integrate with other apps. For instance, Google Now can set reminders or calendar appointments based strictly on what you say verbally. You never need to interact physically with the phone. “OK, Google,” is all you need to know to get started.

Of course, this can be broadened to other apps. Dragon (one of the pioneers in the voice recognition sector) has been using these techniques for years. Microsoft’s Windows has also long had a speech recognition system baked right into the OS.



Self-Driving Cars

The advent of autonomous vehicles is almost upon us. It won't be long and you'll have the option of buying a car that not only offers driver assist, but can actually take over and drive for you for the duration of the trip. Google's self-driving car is probably the most famous of them all. These vehicles have been actively driving the streets of California for a while now.

However, the search engine giant isn't alone. There are plenty of other companies intent on building a self-driving car and getting in on the action, including BMW, and even Apple.

Obviously, these cars must go beyond merely driving a pre-programmed route. There's just too much room for error here. Self-driving cars must be able to learn. They must be able to tell the difference between a mailbox on the side of the road, and an individual that might at any moment step out into traffic.

Not only must they be able to tell the difference in these objects, but they must be able to anticipate what may happen. That's a

lot of decision making needed, and it all stems from the ability to learn and develop.



The Future of Machine Learning

While self-driving cars are definitely in the immediate future, there are many other applications for apps that learn. In this section, we'll highlight just a few of the most pertinent.

The Re-Rise of Local

This one is actually already in full swing. It's not the future. It's now. When the Internet first changed the way we shopped, local retailers took a huge hit. Amazon and other ecommerce companies quickly grew, while the market share for local businesses shrank.

That's changing today, and it's all thanks to apps that learn (as well as things like the buy local movement).

One of the most interesting elements about the re-rise of local is that technology is being used to transform the shopping experience. It's also not just "local". You may hear the term "hyper local", and that's as good a descriptor as any. Essentially, shoppers and retailers are using smart technology to interact within the immediate area.

Here's an example. A shopper parks her car and heads to her local downtown shopping area. She's looking for quite a few things – new school clothes for her kids, a new pair of shoes for herself, a few things for around the house. Oh, and she's hungry – it's about lunch time. As she walks, her phone interacts with other devices nearby (beacons) to provide her with information about things like:

- ❖ Items that might appeal to her based on her actual interests, wants and needs
- ❖ Special deals only available to local buyers
- ❖ Limited time offers

This information is delivered to her through her phone, by smart apps. These apps learn about her behavior, about what she wants and needs, and then communicate with other devices in the surrounding area to bring her information about things that might answer her needs.

It's all about combining the intelligence of online shopping with the immediate gratification and proximity of physical shopping, combined with the ability to benefit the local economy. That's something that ecommerce just can't offer.

- ❖ In-store sales and promotions



Digital Protection for Online Surfing

For all the benefits that it's brought us, the Internet has also ushered in a new age of threats and danger for consumers. Information theft is huge today – phone numbers, Social Security numbers, credit card numbers, bank account information and more are all fair game, and it can be incredibly difficult for a consumer to protect themselves from malicious hackers, viruses and malware. However, machine learning and smart applications can and will change this.

IBM is actually working on what Big Blue calls a “digital guardian” that will work to protect your personal and financial information. According to the company, the digital guardian will track your activities, information and data back for several years in an attempt to learn more about what it should

protect and how to do that. Interestingly, it does more than just wall off your data from prying eyes. It can even determine how your information should be used and alert you based on breaches or leaks.



Changing the World of Education

Learning is vital for children, but it can be problematic, particularly in this day of overcrowded classrooms and understaffed schools. Machine learning is going to help, though. Smart apps that learn will bridge the gap between things like MOOCs and cloud-based education platforms to create something completely new. And it's not pure fantasy, either. This system is actually already in use in Georgia's Gwinnett County school system.

The system uses information about student test scores, as well as learning behavior, in-class performance and a vast quantity of other information to help students learn better,

retain more information, and see greater success than what's possible with traditional classroom situations.



Big Data in Medical Care

Medical care is oddly not patient-tailored. Often, it's a one-size-fits-all approach that may not offer the best results. For instance, many cancer treatments fail to eradicate cancer cells because these cells can vary greatly from one patient to another.

With the rise of machine learning, it's now possible to use a patient's own DNA to create custom-tailored treatments that fit their unique patterns and requirements. This is of paramount importance to cancer patients around the world living on borrowed time, but cloud-based medical apps can provide immense benefits to patients with virtually

any type of medical condition, or even those just looking to stay happier and healthier.

Cities Learning from Citizens

By the year 2050, almost three-quarters of the earth's population will live in cities. This poses several problems, including an exacerbation of the current issues where city leaders and citizens very rarely see eye to eye on almost anything. Learning apps can and are helping to change this by making it possible for city leaders to learn from and interact with their citizens.

This certainly has an impact on the city of today, but it's the city of tomorrow where machine learning will really come into its own. The city itself will be able to learn from and about its residents through a wide range of interfaces, all of which are tied to the cloud. Imagine the implications of sensors, cloud technology and real-time information flow for benefiting how we live our lives on a daily basis.

The repercussions here are immense. Imagine running city bus routes not on a timetable basis, but on a citizenry-demand basis. The time and fuel savings would be significant,

plus cities would save on payroll for drivers (automation for city buses is also coming, which would reduce costs even further.). Another example here is the ability for city planners and developers to learn about accessibility issues from the people it affects directly, or for the city's transportation department to learn about potholes and other damage in real-time, allowing faster repairs and smoother, better maintained roadways.

Considerations for Developing Apps That Learn

As we mentioned previously, machine learning must be implemented correctly in order to be effective. For instance, Microsoft's age-verification system was a colossal disaster in terms of accuracy, although it marked a milestone in machine learning and application development.

A developer implementing this solution into an application would have not been able to deliver value or a good end user experience. There are quite a few considerations that need to be made when developing apps that learn in

order to ensure accuracy, quality, good UX and more. In this section, we'll address some of the most pertinent.



More Data Means Greater Accuracy

When it comes to creating apps that learn, the more data, the better. In short, the more data available to an algorithm, the more accurate the results will be. For developers, this means not subsampling in order to support the model complexity required for the situation in question. This means that any learning app should have access to all of the data available, not just a small sampling of that data.

Not All Machine Learning Methods Are Created Equal

While machine learning is still relatively new, there are several different methods available. They all work to one extent or another, but

they're not all ideal for every situation. One learning app might benefit more from the Gradient Boosting Trees method, while another would be better suited for something completely different, such as the Super Vector Machine method. The developer must identify the machine learning method that works best for the problem at hand.

Bad Data Creates Bad Learning Models

Data quality is paramount in creating learning apps. If the data is bad, the learning model will also suffer. There is a direct correlation between data quality and app success. Therefore, it is imperative that the data utilized be thoroughly cleaned and analyzed (data science). In addition, the data generation process also needs to be analyzed, often with the assistance of a subject matter expert (SME).

Translating Real World Problems into Machine Learning Models Can Be Challenging

It's very important to understand that real world problems, whether facing consumers or businesses, don't usually translate directly into machine learning algorithms. For instance, building an app that learns about

behavior in order to help detect and then prevent fraud within a business will require that the right formulations be used to create the machine learning algorithm.

Using one of the more widespread formulations might not yield the best results, either, because, while these formulations are well-known, they are not as powerful as others out there. It is imperative that developers have a firm understanding of all the options in order to choose the right path forward. This can be very difficult for app developers, particularly because a host of business and consumer problems are not widely discussed in academic or training materials.

Data Modeling Is Essential

In a learning app, data is configured into "objects", with different features being "characteristics" of those objects. However, data in the wild does not fit neatly into these pigeonholes. It's broader, deeper and less structured.

In order to access and analyze data, it must be first molded and modeled, transformed from

its raw state into something that the app can actually use for learning. This usually requires an additional step between data generation and data usage – and developers will need to account for this during app creation.



OpenXcell Leads the Way in Learning Apps

At OpenXcell, we're proud to be leaders in the app industry. We've been a part of this sector since its birth, and we remain dedicated to providing industry-best results for our clients. Our expert developers are very well versed and highly trained in the intricacies of machine learning, allowing them to create cutting-edge apps that learn quickly and accurately.

We fully understand the many considerations that go into learning app development, from choosing the right machine learning method to data modeling to data sourcing and cleansing, and everything in between. In fact, we helped to pioneer many of these methods.

Our expertise in mobile app development is unparalleled, and we're capable of offering virtually any services required, whether you're building an app for in-house use within your business or organization, or intent on releasing the next big thing for consumer use.

We invite you today to know more about us and our app development solutions and how they can fit your needs.



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