
Business Perspective in Artificial Intelligence
AI
Prashant Kikani
AI

Content

Purpose of this book

Artificial Intelligence(AI) is one of the most fascinating technologies of the 21st century. AI is already being used in health care & medical, defence & security, finance, sports, education, climate change, entertainment, real-estate etc fields.

That being said, AI is not just about algorithms & tools. For a better long term, we should learn how to monetize this amazing technology. Companies will not use this in mainstream if they are not getting any profit from this.

Purpose of this book is to view AI from a business perspective. What are the possibilities one can monetize this technology while providing extraordinary & value adding products & services.

No prerequisites are required to read this book. Anyone who understands English can read this book ! This book is truly for everyone.

-Prashant Kikani

Features

- To the point explanation.
- Explanation in an easy & intuitive manner.
- Simple & non-technical words.
- Easy to understand language.
- Short & meaningful sentences.

As you don’t need any prerequisites to learn from this book, I have not used maths or scientific equations to explain things.
I have used simple intuitive text & images to explain things.
So, that everyone can use this to gain knowledge.

This book tries to show AI from a business perspective. How an individual / an organization can leverage this fascinating technology to generate profits.

Because of the above things everyone, especially people who don’t have much experience or background in maths & computer science also can learn from this book.
Maintaining our tagline, “Artificial Intelligence for truly everyone” !

What will you learn from this book ?

You will learn many practical applications of AI, machine learning & deep learning through which companies like Google, Facebook are earning huge profits.

This book represents a unique way to look at the AI field which not many people discuss.
Core idea behind this book is

"*Artificial Intelligence(AI) is not just about tools & algorithms. We should also explore business perspectives for better long term results*".

Above line itself explains what this book is about to offer you.

I have not covered much details about AI technology itself like "how it works?" etc.
I have explained them in a separate book "Distilled Artificial Intelligence" in simple non-technical terms without requiring any prerequisites.

So, in short, you will learn how you or your company can earn profits from the AI field.

-Prashant Kikani

Business perspective in Artificial Intelligence (AI)

In this book we are going to focus on the business side of Artificial Intelligence(AI).

Artificial Intelligence(AI) is not just about tools & algorithms.

For better long term results companies, organizations & even individuals need to learn how to monetize from AI.
If it's not monetizable, companies will not use it actively in the long term.

By the way, Mckinsy is saying, AI to create $13 Trillion Value by 2030 mostly to be used in Retail followed by Travel and Automotive sector.

What's the difference between traditional businesses & businesses backed by AI?
Let's see.

Fundamental difference is,
Traditional businesses revolve around "people & capital"; while business backed by AI revolve around "AI & capital".

If we see, there's a big difference. *People vs. computers*.

AI automates or will automate what a human can do.

- It can recommend you movies like a pro movie reporter/critic.
- It can predict cancer in human lungs like an experienced good doctor.
- It can drive cars like an expert driver.
- It can suggest your future life partner on dating sites like a pro matchmaker.
- It can detect fraudulent transactions like a master CIA agent.

Additionally, this AI can do these jobs 24 x 7 x 365 & you don't need to pay these machines at all like we need to pay human employees !
How cool is that?

Basically, businesses backed by AI automate tasks which only experts / masters of the field were able to do a few years ago.
That's the biggest difference.

As I write this, in the year 2020, computers trained by AI are capable of automating many tasks which only humans were able to do a few years ago.

"Automation" is the key behind businesses backed by AI.
Companies try to automate everything they can to increase customer's engagement & profits.
For example,

- Google uses it to automate the best personalized search results.
- Netflix uses it to recommend best movies & TV shows for each customer to create more engagement.
- Uber uses it to select the best ride for you.
- Facebook uses it to automatically tag all the persons in a photo post.
- Amazon uses it to lower the return rates of shipped products.

Not only automation, they build **whole new markets & products** around AI.

- Tesla, Uber, and Lyft created self-driving cars.
- Facebook is using facial recognition to automatically tag people inside a post.
- Google is using speech recognition in their home related products.
- Tinder is using AI to figure out who you're likely to "Super Like" !

Even though AI technology is in its early stage, AI backed businesses & companies are already launching AI based products / features & making tons of money !

We are going to answer the following questions that may come to your mind:
What are business opportunities in AI?
How can one earn money from AI by using it in their company or organization?
What are the existing products & companies which are using AI to make tons of profits?
How to grow & maintain business perspective in AI?
How to monetize this technology by making better products & services?

So, let's start !

1. <u>What do I mean</u> by “business perspective in AI” ?

That’s a very basic question before reading this book.

By “business perspective in AI” I simply mean to look at some ways companies or individuals can monetize AI technology by providing better products & experiences.

That’s all.

Core idea behind this book is “for a better long term, AI should not be just about tools & algorithms. Companies & individuals should know how to monetize it.”

We should also think about solving real personal/industry problems leveraging AI.
Companies will not use it in the mainstream if it’s not providing them revenues.

AI is a comparatively new technology.
Many people don’t know much about it.

So, it may be a bit harder to understand how one can create businesses around it.
That’s why the sole purpose of writing this book.

2. <u>What you will get</u> by leveraging AI in businesses ?

This is a very fair question to ask.
Answer is,

Automation.

AI will help you to automate things in your business which were only possible by humans before.

Why does automation matter?

Because it will *help you to save costs* of human employees while not compromising quality of work.

It is not hard to understand automation is crucial in businesses.
Companies want to increase revenues & decrease costs.

AI can do just that.
We will see how AI can add value to businesses in this book.

Top companies like Amazon, Apple, Google, Microsoft, Facebook etc have automated many processes in their businesses to grow rapidly.
Not just big companies, startups also can scale fast using AI.

Companies want to increase revenues & decrease costs.

Simple automation was also possible with simple computer algorithms.

But machine learning enables us to automate things which *only humans were able to do*.
We want to automate almost all the tasks & things so that we don't need to do them ourselves.

We have already seen this in the beginning but mentioning it again as it's related to the topic.
Giant companies use machine learning to *automate* almost everything.

- Google uses it to automate the best personalized search results.
- Netflix uses it to recommend best movies & TV shows for each user to create more engagement.
- Uber uses it to select the best ride for you.
- Facebook uses it to automatically tag all the persons in a photo post.
- Amazon uses it to lower the return rates of shipped products.
- And many more like these..

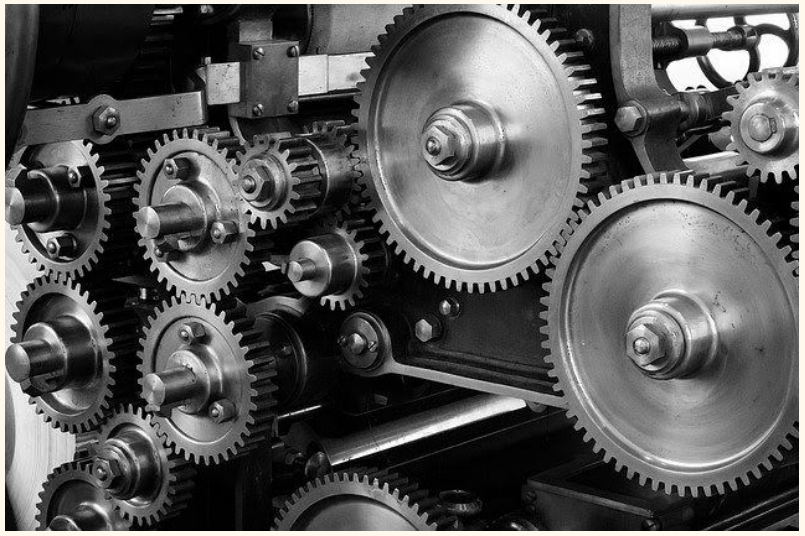
Not just big companies, startups also can scale fast leveraging AI.

We are going to see the business perspective of AI in the later part of this book.
In other words, how to monetize AI or how to earn profits from AI.

2 major benefits of automation

1. *Performance*
   Humans are error prone. Machines don't make mistakes. This is a big factor in increasing automation.
2. *Cost*
   Companies need to pay humans continuously every month/week. While companies can buy software once & use it unlimited times.

Both "performance" & "cost" favors in support of automation.
Companies are eager to automate tasks to reduce costs & improve performance.



Automation is the key to scale businesses

Full automation will change our daily life by a huge positive impact.

- We don’t have to waste hours in traffic.
- We don’t need to pay attention to the road while driving. Vehicles will be self-driving. We can do more important tasks than driving.
- We can get personalized education while staying at home. **High quality, low cost**.
- Doctors can become more efficient. Easy tasks can be solved by AI itself.
- Defence & security will become more efficient & hard to break than ever before. Governments don’t have to spend billions of dollars in the defence department.
- We can fight climate change with AI. Even farmers can get help from AI. They can automate their daily tasks.

And many more like that.

Automation can increase productivity of every person, increase revenues & cut costs for companies & eventually boost the economy.

Gradually, things we need to care about in day to day life will keep decreasing; to allow us to focus only on highly important things.

3. Traditional businesses

Let's first understand what are trying to improve with AI. *Traditional businesses*.

Traditional businesses are those who are using old techniques & methods to reach out to their potential customers & sell their product / services.

Traditional businesses revolve around "people & capital", while businesses backed by AI revolve around "AI & capital".

The fundamental limitation of non-tech, legacy or old businesses is they can't scale fast like IT based companies.

Traditional businesses reach their potential customers via billboards, print ads in magazines & newspapers, phone calls etc.
While, businesses which leverages the benefits of computers & mobiles, reach their customers via platforms like social media, email & text messages.

Second way is way more faster & efficient than the first one.

When WhatsApp or Facebook gets a new user, it costs them almost nothing.
They just need to spend on data centers & employees.

So called “social media influencers” will create content for new users & their friends & relatives will make the platform more engaging for them.

That’s what makes an IT based business easily scalable to **billions of people**.
It would take traditional businesses several decades without leveraging technology.

We just need to *automate things* like customer onboarding, reaching them regularly, accepting payments & selling products etc.
Traditional companies need people to do it.

That’s not it.
We haven’t added AI to them yet.

AI automates things at a whole new level & scale.

We automate tasks which were unique to humans like reading, speaking, listening, translating from one language to another, viewing images, recommending products etc.

AI & ML scales at the same speed as IT companies. But at more broader & new tasks.

Limitations of traditional non-tech businesses.

1. Can’t scale fast

Number of people traditional business can reach in the first year is limited to nearby local areas or cities.

One of the main hurdles traditional companies which don’t use powers of computers & AI face is, *Distance*.

Customers need to visit physical stores or offices to use their products or services.

We don’t have to visit Facebook or Google headquarters & offices to use their products & services !!

This sounds naive but it’s a major factor of their market penetration.

2. Higher dependency on human employees

As a non-tech business grows, it needs to hire people who can manage day-to-day things to handle their customers.

Do you know WhatsApp just needed 50 people to manage their 900 million users?

That’s huge.
Traditional companies need to pay those people regularly.

3. Lake of automation

This is crucial.
Automation of things is a catalyst in businesses.
Proper automation cuts the costs of employees & improves overall performance as well.

Above 3 limitations are major ones traditional businesses have that are removed in AI backed businesses.

Solutions of problems of traditional businesses

1. Websites & mobile applications

These two help IT companies to scale fast.
Almost everyone has a smartphone in their pockets.

Internet connection has reached almost 1 out of 2 people on the whole planet (that's ~4 billion people with internet connection).
Having mobile applications & websites of company enables you to reach all of them.
Then we add AI to those apps.

After that, customer engagement increases drastically.
This is the reason IT companies can scale so fast.

2. Machines do all the work (almost full automation)

Codes written by software engineers can serve millions of customers/users simultaneously.
Whole customer journey through their services & products are automated.

AI & machine learning based models built by data scientists can improve customer's experience & create more engagement.

They chat / talk with customers to handle their queries, they recommend customers other items they can use, they make sure the customer is happy with the product etc.

We just need to write these codes only once & it will serve us forever !

I keep using the word "automation" because that's at the very core of AI backed businesses.
Automation at a very big scale in diverse tasks.

I have written a separate book which covers many things about AI, machine learning & deep learning in simple non-technical terms called "Distilled Artificial Intelligence".
Without requiring any math or computer prerequisites, you will get tons of knowledge about AI.
I recommend you to check it out if you want to get more info here.

--
Traditional businesses lack automation & because of their higher dependency on human employees, they can't scale fast.

4. How to grow business perspective in AI ?

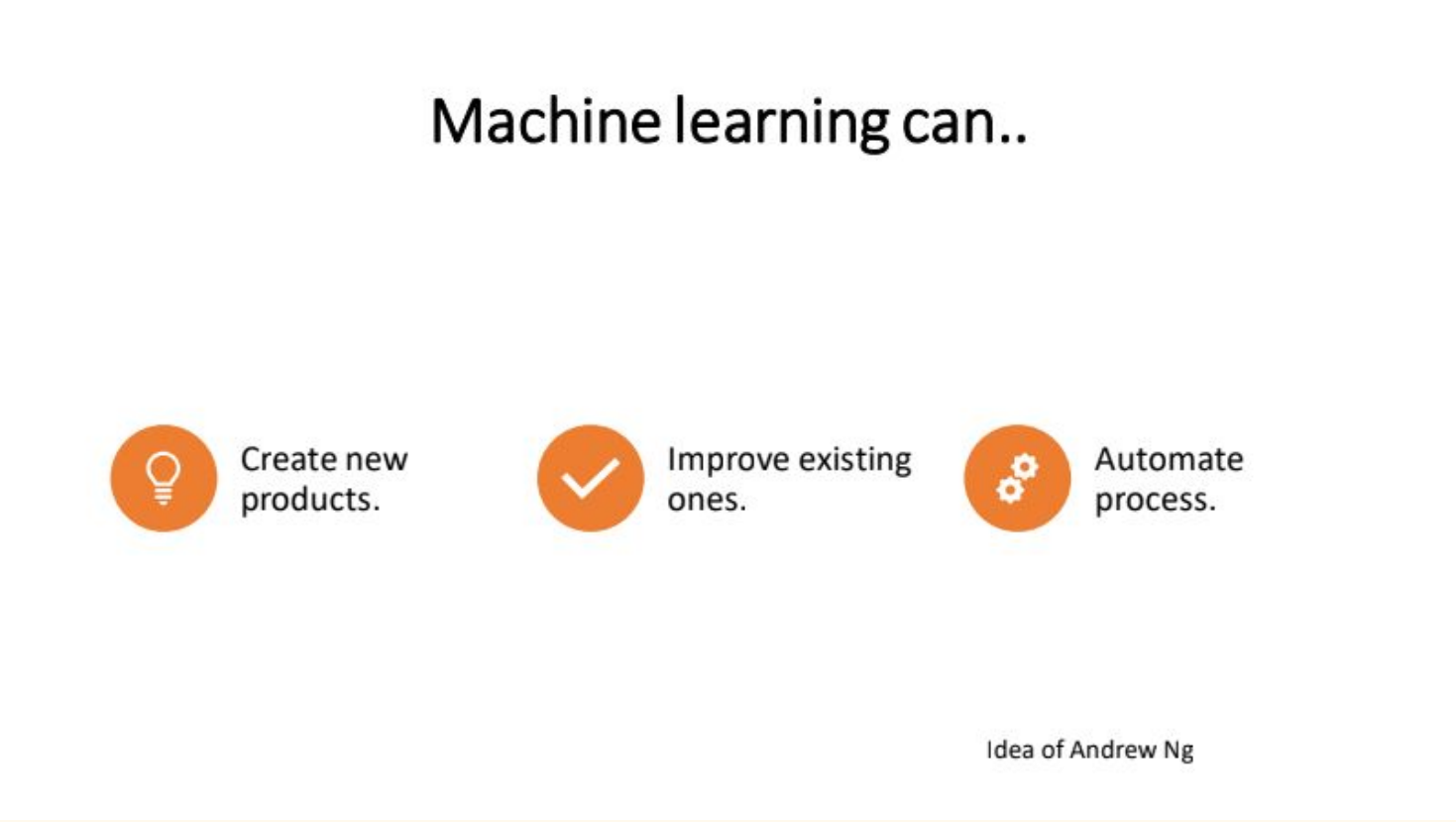
Let's discuss how one can *start* looking AI from the business perspective.

Fundamental idea of any business is,

Revenue - cost = profit

If your revenue is higher than costs, ROI is +ve, your business will make tons of money.
If your costs are higher than revenues, it's -ve ROI. Companies will lose money.
It's simple.

So, our sole aim should be to increase revenues **and** decrease costs.
Let's see.



1. Create new products. (*to increase revenues*)
2. Improve existing ones. (*to increase revenues*)
3. Automate process. (*to decrease costs*)

Let’s discuss each of them in detail.

1. Create new products. (to increase revenues)

AI & machine learning can create new products & sometimes entirely new markets.
Previously without AI these products & markets were not possible to create.

Let’s see some examples in brief.

Self-driving vehicles

This is one of the best examples. Vehicles were there from decades but it changed the way we interact with them.

Drivers don’t need to pay attention on the road while driving time & can do all other important work like attending a phone call or preparing a presentation.

Not only that,
It created a *whole new market* for self-driving taxis & renting our cars for others for transportation & make money for us.

We can make money by owning a self-driving vehicle & we don’t need to do anything !

Customers will use our car for transportation, AI will drive the car & you sit at home !

How cool is that !

Chatbots

This is also a whole new market to serve your customers automatically.
As companies' total number of customers grows, we need to handle their queries & doubts.

When you have millions of customers, managing call centers is very costly.
Insted what you can do is hire some bots (or virtual robots) & they will do conversations for you & handle customer’s doubts & concerns.

Chatbots are machines, they can handle thousands of customers at a time.
And make no mistake, the quality of serving customers is not compromised. They do conversation just like humans.

Conversation bots like Apple Siri, Amazon Alexa etc use tons of AI.

This technology is not at its full potential as of now (year 2020).
But it can for sure reduce traffic to companies call centers.

Other products & services

Translation bots.
Language is one of the things that is core to humans. AI can translate whole books & blogs for you !

Stock market analysis.
80% of the stock market is on auto-pilot handled by machines !

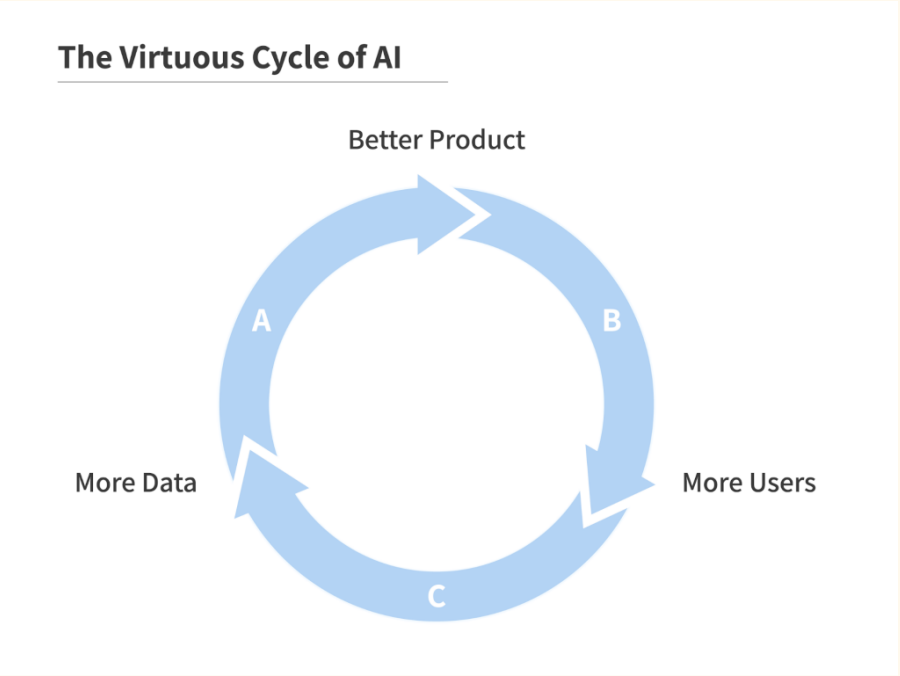
Dating sites.
Machines will suggest to customers their possible matches for life partners like an expert matchmaker !

Recommendation engines.
AI can recommend movies, TV shows, songs etc. Idea is to increase customer engagement by smart suggestions.

In short, AI has the capability to create whole new products & markets.

2. Improve existing products & services. (to increase revenues)

Legacy companies can use AI to improve their existing products as well.



Cycle of AI products (source)

Above figure tells,
The more data we gather, the better the product becomes as the AI model becomes better.
As the product gets better, more users will come.
The more users come, more data come
&
This cycle continues.

Traditional & legacy companies / businesses can do a lot of things leveraging AI & machine learning.
User attachment will increase with products because of smart services & products.

Overall, this will help AI backed businesses to kill the competition.

Let’s see some examples.

Recommendation

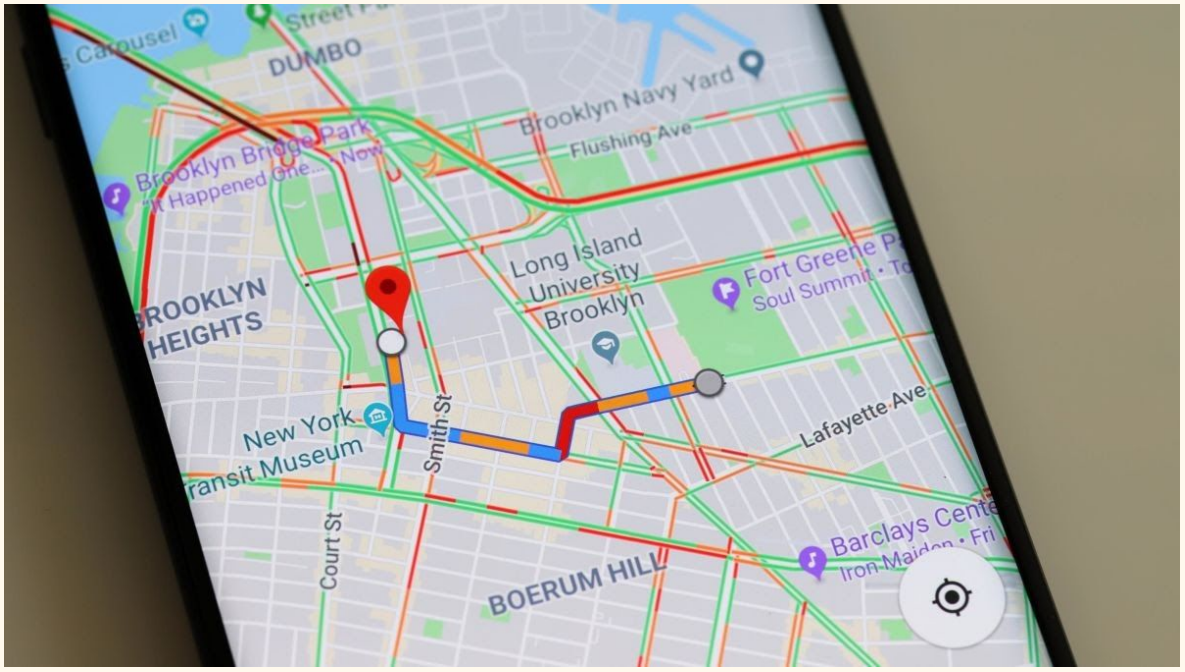
Movies & TV shows were there from decades.
Adding recommendation increased *user engagement* to a whole new level.

Recommender systems essentially captures human behaviour.
Netflix, Spotify, Amazon etc. are using recommendation everyday.

Art creation

AI (deep learning models to be specific) can help artists to help imagine new possibilities.
Quality of paintings & music from artists & music creators can increase by a huge amount.
This also differentiate artists' work & kill the competition.

Google maps



Maps were there for decades.
But Google maps did something different. It optimizes total travel time for every user by providing best routes.

Millions of people use it everyday.
Google is also earning millions by selling it to companies like Uber, Zomato, Swiggy, Ola etc.

In short, AI can help improve existing products & services by adding new features to kill the competition.

3. Automate process. (to decrease costs)

Essense of automation is to train machines to do repetitive tasks.
We can save time & resources as things are handled by machines now.
Ultimately, it cuts the costs for the company.

Let’s see some examples here as well.

Language translation

This is one of the best examples for automation.
There’s a huge market for translation.

News agencies, academic organizations, social media companies need to translate their text content into other languages to increase their potential audience size.

To correctly translate text from one language to other languages, one needs to have experience in those languages & should have knowledge about linguistic features of languages.
It’s a hard thing to automate.

But thanks to artificial neural network models from deep learning, this has become possible with great performance.

Visual inspection

Inspecting machines & processes in huge mechanical factories is a very critical & demanding task.
Until now, this process was handled by human inspectors. Humans can make mistakes.
Using AI (computer vision algorithms to be specific) we can make this faster & more accurate.

Visual inspection. Human checking quality of products.

Companies not only can use these tools in their factories but can also sell to other pier companies. This saves the cost of human visual inspectors.

We have seen how AI can increase revenues & decrease costs. Ultimately increasing profits.

Now let’s see how we can maintain whatever we have gained?

--

We can grow business perspective in AI by creating new products backed by AI, improve the existing ones & automating processes.

5. How can you leverage AI in your business ?

After discussing how AI can play a crucial role in your business,
Let's discuss how to use it.

Basically we will need *3 things* to use AI in your products / services.
1. High quantity & quality data.
2. Best talent who knows AI.
3. Domain expertise.

Let’s see each of them in detail.

1. High quantity & quality data.

Any *task*, for which lots of data is available, can be automated to some degree with AI & machine learning(ML).

Data plays a crucial role in the performance of AI models.

Let’s take an example.
Assume, you are working in the bank transactions sector.
And using an AI model, you want to predict whether one financial transaction is fraud or genuine.

Using this model, AI will detect fraud or illegal financial transactions 24 x 7 x 365 for you.

Now, you will have all the data about transactions that happened in the past.
Like whether it was fraud or not, transaction amount, date, time, people involved in transactions etc.

Using that data, we can train an AI model which will learn,
“Given all the data about a transaction, predict whether it’s genuine or illegal/fraud.”

Another example can be,
“A person has taken a loan / mortgage from a bank, predict whether he / she will be able to return it on time or not“.

You got the idea.
In short, almost any task can be automated to some degree by AI if we have stored lots of data from the past of that task.

Other than data quantity, data quality also matters a lot.
Like, data should not be biased towards any particular thing.

By “biased” I mean, it should equally represent every aspect.
Like, Google predicted black people as gorillas !
Why? Probably because their data was biased.

2. Best talent who knows AI.

This is kind of obvious.
A small team of people who know the ins & outs of algorithms & techniques of AI & machine learning is crucial.

A good problem solving skill is crucial.
This is a bit technical but,
One thing that is good to have is *intuition*. There are tons of algorithms & techniques to use.
A good intuition is very helpful to start in selecting the algorithm / model.

3. Domain expertise.

A good AI team may have knowledge about how to build AI / MLmodels & all.
But it's good to keep business & domain specific people in the team.

By "domain specific" I mean, people related to the project field.
Like if our project is related to the biology field, some people who have that kind of knowledge & background should be there.

Some business people inside the AI team are also good to have to check whether solving this problem will help overall business or not.
Generally this task is handled by founders of the companies.

Ideally, we should select those projects which are feasible & valuable for the business in the long term.

Along with the above 3 requirements, a **good amount of hardwares** is also good to have; especially for deep learning algorithms.

Artificial neural networks are slow to train in normal CPU.
People use GPU (Graphics Processor Unit) or TPU (Tensor Processing Unit) for faster speed.

One should comparatively more weight on #1 thing. **Quality & quantity of data.**

Data has enough power to make or break the whole project.

See pitfalls to avoid at the end of this book.
One should keep in mind those things before investing in AI projects.

I have written a separate book which covers many things about AI, machine learning & deep learning in simple non-technical terms called "Distilled Artificial Intelligence".
Without requiring any math or computer prerequisites, you will get tons of knowledge about AI.
I recommend you to check it out if you want to get more info here.

--
So, to use AI in your business / company, a huge amount of quality data is very crucial.

6. How to use AI in your existing products ?

This is especially important for small & medium businesses (SMBs).

For SMBs, creating **new** AI backed products from scratch may not be a good idea.
So, how can they improve their *existing products* by leveraging AI & machine learning?

3 things we can do to leverage AI in existing products / services.

1. Automating the most time & cost consuming part of the process.
2. Increasing sales or user engagement with the product using data we already have.
3. Adding new AI backed features in our existing products.

Let's look at each of them in detail.

1. Automating the most time & cost consuming part of the process.

Imagine a production pipeline for our existing flagship product.
Our product passes through all the stages to be ready to serve to customers.

Now, from one of those stages, one stage is the most time/cost consuming.
If we can automate it, our production will move faster.

Total time starting from raw materials to final product will reduce.

Let's take one example. We have already discussed this briefly about this.
In our product development pipeline, we have one visual inspection task.
Goal of the task is to do quality checking of the product.

Right now humans are doing it manually.
That's why this task is comparatively slow & costly.

What if we can automate this?
Images will be captured from camera & that will be sent to our AI model.
We have trained that model to classify whether products in the image have good quality or not.

AI models can classify ~10 images per second.
And after that, some mechanical robot arms will remove bad quality products.
So, it will take ~0.2-0.5 seconds per product to complete quality checking.

That's so fast !
Definitely faster than humans.

Because of this automation, total production time from raw material to final product will get reduced.

And our users will get products faster in their hands.

2. <u>Increasing sales</u> with the product using data we already have.

How can AI help in *sales*?
Let's take one example.

Demand forecasting.

If we can forecast or predict that this product is going to be in high demand in the next month or quarter, we can produce it more & store them in our warehouses.

If we store products which are not going to sell that much, then there is no point in producing or storing them.
In other words, it's kind of "*optimized use of warehouses*".

Dynamic pricing.

We can even set the dynamic price of that product according to demand during the day.
E-commerce companies like Amazon use it for their products to increase profits.

3. Adding new AI backed features in our existing products.

Adding new innovative features will increase customer engagement with our product.
It will also help in killing the competition.
One good example is Snapchat's filters.

Snapchat uses facial recognition & other computer vision techniques to create filters around a user's face that looks real.
Snapchat added that feature & users got attached with that.

This type of feature also can become a company's competitive moat.

--

So, for small & medium businesses, AI can improve existing products by automation, increasing sales & adding new features.

7. How to maintain business perspective in AI ?

Earlier we have seen how to “grow” AI in businesses.

Growth alone isn’t sufficient.
For a better long term, companies need to maintain their market share to survive.
Can AI help them to do that? YES !

Management people say increasing revenue is more important than cutting costs as cutting costs can damage product quality.

There is only one thing that summarizes “maintain” our growth.
To maintain market share,

“Create a competitive moat”.

Okay, what is a moat then?
In business & economic terms, it simply means creating **competitive advantage** over your competitors.

It’s very simple to understand that, in the long term, if one company needs to generate huge profits, **it must have something that their competitors don’t have.**

In other terms, the product you are building must not be easily replicable.

That's what *competitive moat* means.

If you can create something which is very hard to possess or very hard to copy for your competitors, congrats, you have a competitive moat.

Now, let's see how to do this by some examples.

1. Google search

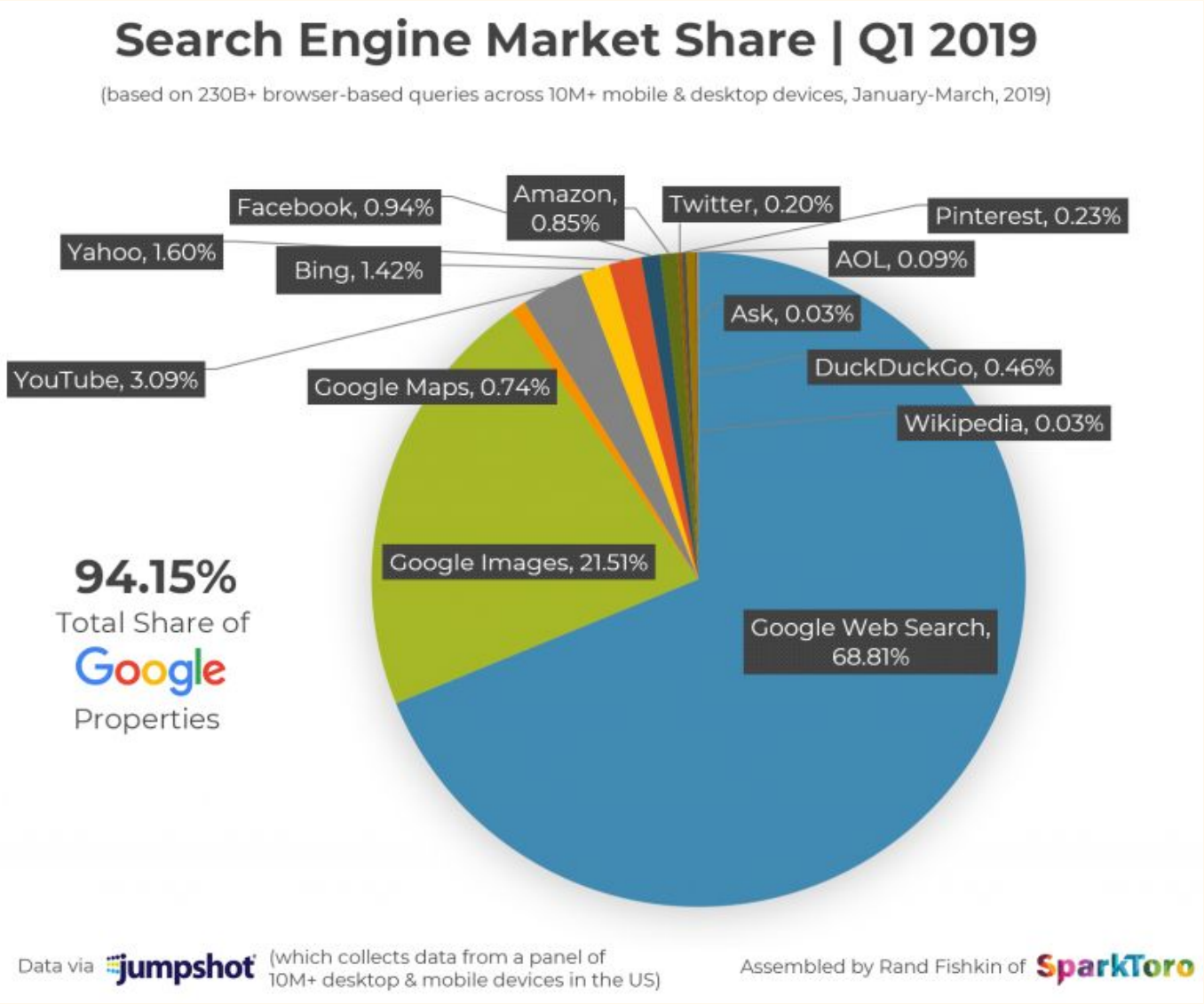
Google is almost a monopoly in web search with ~94% of the market share.

How did they do it?
By providing best personalized search results to users.

Web search is perhaps Google's most used product.
That's what Google is known for.

Google earns through selling ads through their web search in browser & YouTube.

There are many products of Google but most of the revenue comes from advertisements itself.

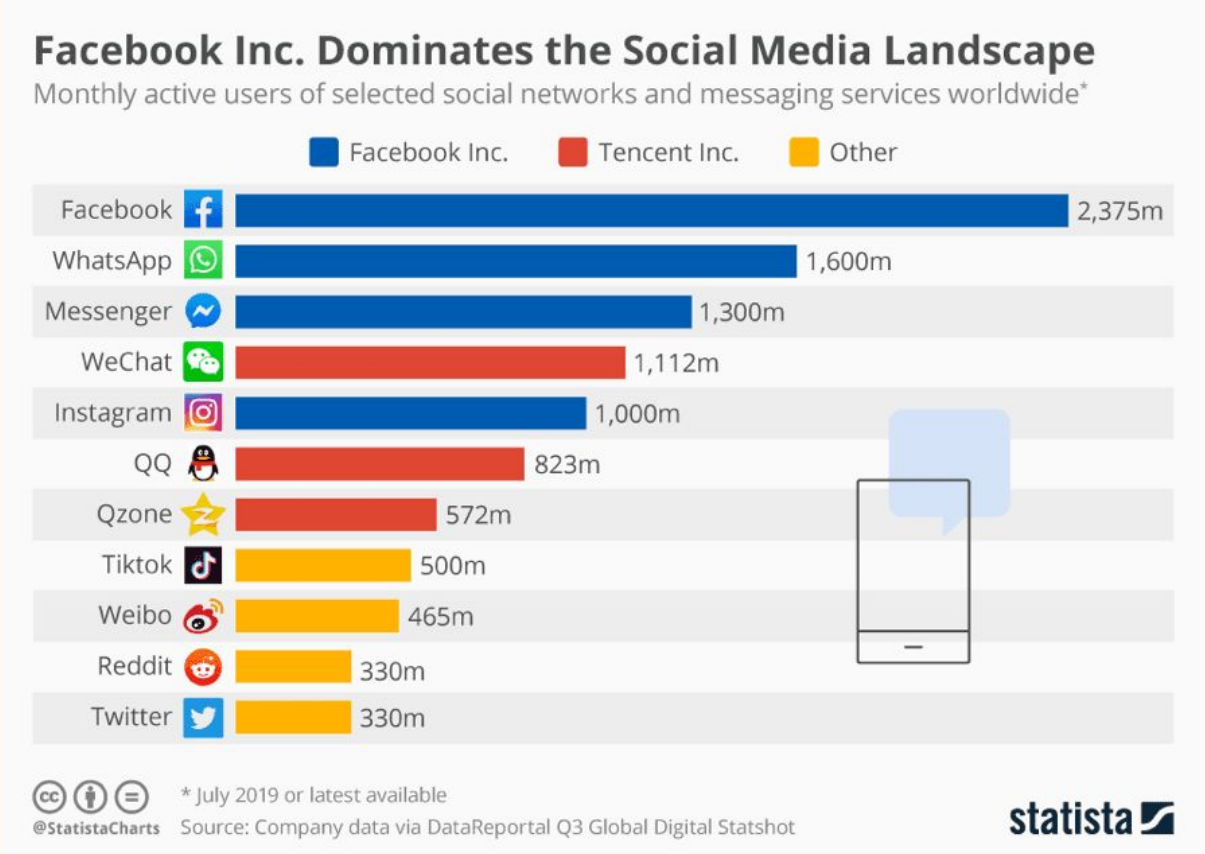


Google's market share in "Web search" (source)

They are using the latest deep learning models like BERT into search everyday across the globe.

2. Facebook feed

Facebook Inc. also is [almost a monopoly in social media] with more than 2 billion monthly active users on Facebook alone (they also own Instagram, WhatsApp & Messenger).



Facebook dominance in social media (source)

Okay.

As we notice it, providing best products & user experience is the key behind it.

Crux is, can we use the powers of AI & machine learning to create the best products or not.

No one can(as of now) provide good personalized search results like Google.
And that is their **competitive moat**.
No one can replicate those search results on their own.

That's how AI backed businesses maintain their market share after growing phase.

I have written a separate book which covers many things about AI, machine learning & deep learning in simple non-technical terms called "Distilled Artificial Intelligence".
Without requiring any math or computer prerequisites, you will get tons of knowledge about AI.
I recommend you to check it out if you want to get more info here.

--
In short, to increase revenues, we can build new products & improve existing ones. To decrease costs , we can automate processes.

8. Real world use cases of AI

We have seen how you can leverage AI in your business & also in your existing businesses.

Now let's see some real world examples of companies which use AI in their products.

We have already seen some examples in the beginning of the book.

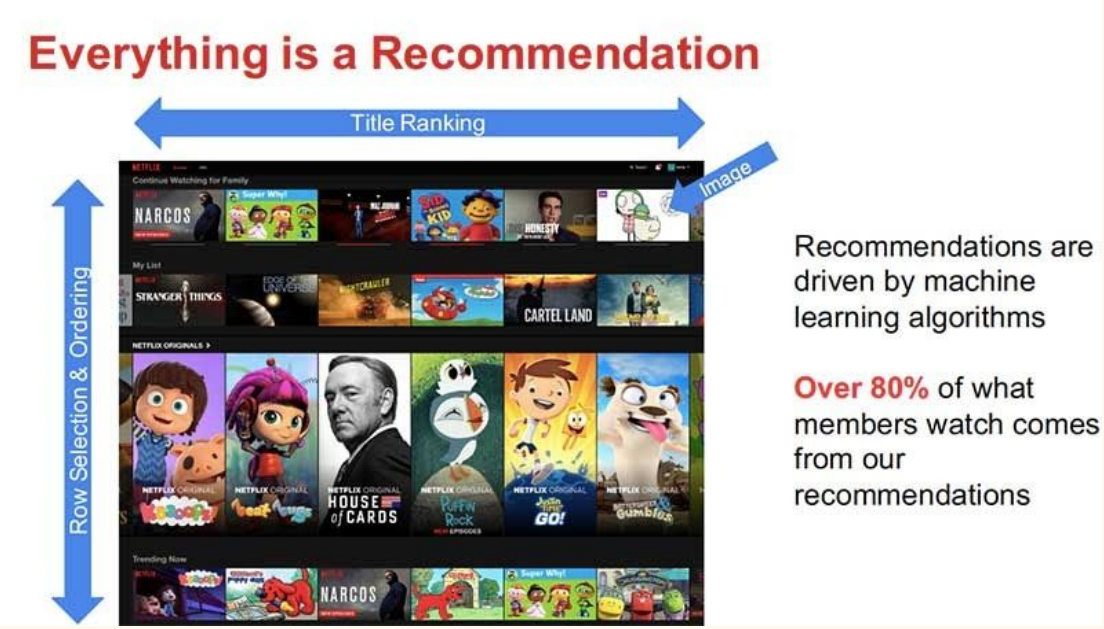
- Google uses it to automate the best personalized search results.
- Netflix uses it to recommend best movies & TV shows for each customer to create more engagement.
- Uber uses it to select the best ride for you.
- Facebook uses it to automatically tag all the persons in a photo post.
- Amazon uses it to lower the return rates of shipped products.
- Tinder is using AI to figure out who you're likely to "Super Like" !
- Tesla, Uber, and Lyft are creating self-driving vehicles.
- Google is using speech recognition in their home related products.
- Smart personal assistants like Apple's Siri, Amazon's Alexa, Google's ok google, Microsoft's Cortana help us to maintain our tasks & improve our productivity.
- Facebook, Twitter, YouTube etc. remove violent & non-appropriate video, image & text content from their platform continuously using AI.

As mobile & internet usage is increasing rapidly, usage of AI has increased quite a lot in the last 5-7 years.

Let’s discuss some examples in detail..

1. Netflix recommendation.

Netflix is using their recommendation algorithms everyday to create more engagement with their users.



Almost every web series we see on the home screen is a recommendation

As of 2014, 75% of their users select movies based on company's recommendations.
This number was ~6 years ago. Now, this number will be very high.

Based on user's past history, smart suggestions of web serieses engage users to see more & more content on Netflix.

In 2012, Netflix hosted a $1 million price competition to improve their recommendation algorithm. That much important recommendation algorithm is for companies.

Netflix said that their AI based recommendation algorithms helped saving them $1 billion per year. Quoting exact sentence from their chief product officer,

"*The combined effect of personalization and recommendations save us more than $1B per year*".

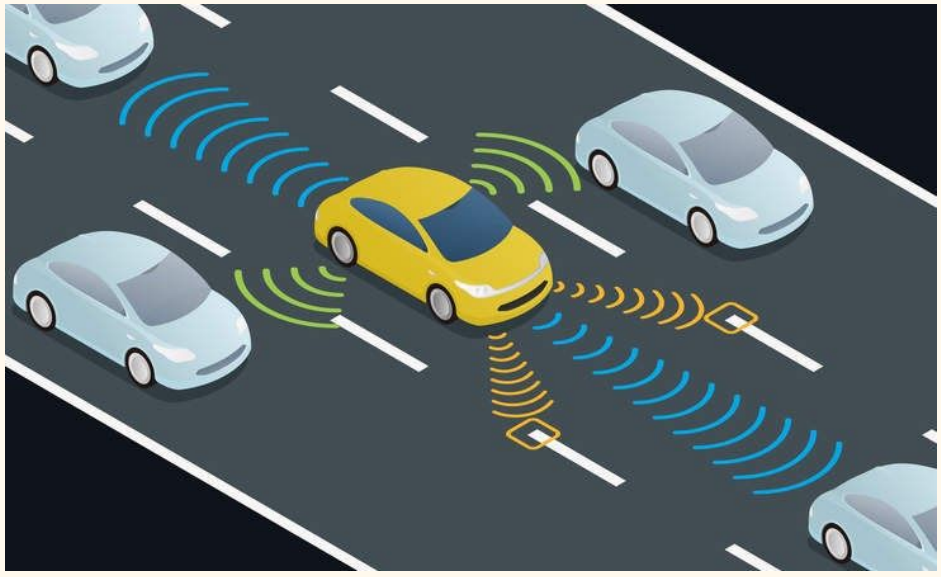
That's what AI can do when we use it at a big scale.

We have already seen how recommendations work in one of the previous chapters.

2. Self driving vehicles.

This is one of the hottest markets in the automobile industry.

We have seen this in brief in “create new products” section in “how to grow business perspective in AI” above.



A self-driving car

Let’s discuss this a bit more.

How self-driving vehicles work?

Self driving cars fundamentally uses computer vision at its core. It contains ~6-8 cameras & sensors on different sides of the vehicle which captures surrounding & feed to the machine.

Then the machine decides what actions should be taken to move ahead safely.

Models that run behind self driving vehicles **learn to classify objects** like cars, pedestrians, traffic signals etc. from the captured images from cameras.

It uses something called “image detection” & “image segmentation” from the computer vision field. We have seen what it is in the computer vision chapter earlier.

In short, it learns how much the steering wheel should be rotated, when to press breaks etc. to go ahead safely.

It doesn’t rely solely on computer vision.
Camera data, sensor data, LiDAR data etc. all things are taken care of while making a decision.

One of the most critical factors of self driving vehicles is *safety*.
Self-driving AI models need to make decisions correctly 99.9999% or almost 100% correct.
Which is very hard to do.

But once it is implemented, a **new era of transportation will start.**

9. How can you get started in AI & machine learning ?

After seeing the potential of the AI & machine learning field, you may want to get started in this interesting field.

In this chapter I will show what you can do to get started in the AI / ML field.

I will divide this chapter into *3 parts*.

1. How to start ?
2. How to grow ?
3. How to maintain it ?

1. How to start ?

This question is very common in almost all of the aspirants.

One basic analogy is, one needs to have at least basic knowledge of statistics, calculus (specially for Deep Learning) and linear algebra to understand concepts of Machine Learning & Deep Learning.

Remember I have said "basic". You don't need to be an expert in it. And if you have done high school studies well, you most probably have it. So, congrats. You already have a base of ML !!

While starting, remember one thing.

Learn in BFS manner, not in DFS manner.

What I want to say is,
try to grasp the overall idea of **each and every concept of ML**.
Don't just pick one algorithm and go very deep in it.

Remember, in ML, there is no one such algorithm which always gives the best result.
So, learn the basic concept of every algorithm. And apply them to some real world data.

Now, the sources.

Andrew Ng's coursera course is a perfect place to start.
The way he teaches ML concepts is very good for beginners.

Also, his Stanford course is very good if you have a background in mathematics as they are more focused on mathematics.

By doing these courses,
you will at least have some idea what ML is all about, and **how things work**. That's what our goal was!!

I have written a separate book which covers many things about AI, machine learning & deep learning in simple non-technical terms called "Distilled Artificial Intelligence".
Without requiring any math or computer prerequisites, you will get tons of knowledge about AI.
I recommend you to check it out if you want to get more info here.

Congrats, if you have reached this far.

2. How to grow ?

There are *2 main ways* to grow your knowledge in ML.

1. Projects
2. Competitions.

Try to build something which includes some algorithm which you have just learned.

It’s not compulsory to select some high level cutting edge project definition.
You can even choose to use the simplest linear regression in your project.

Aim is to implement it and build some real world use cases.

While building them, you will face many issues. But that’s perfectly okay!! Find some fix as per your understanding. And move on.

Second way is Competitions.

Kaggle is one of the biggest data science communities.

Take part in running competitions and learn as much as you can.
Platforms like KDnuggets, Analytics Vidhya are also good.

It's completely okay if your rank is low in these competitions.
Your aim is not to win millions of dollars by winning these competitions, your aim is to learn something.
RANKS REALLY DOESN’T MATTER, if you are learning new things & improving yourself.

You know, generally, in these ML competitions, 1st rank will have let say 0.98598 accuracy and person at 200th rank will have 0.97198 accuracy.

Rank difference is very high. But the score is nearly the same.

Read and try to understand other people’s view on the same problem by Kaggle kernels.

Many working professional data scientists share their point of view by kernels.
That is the **best and fastest way** to capture important things.

They have experience and knowledge.

See how they think and grow your thinking process that way.

By doing this, you will surely not be a beginner in ML. Your level has improved.

Congrats!!

3. How to maintain it ?

Maintaining is more important in the long term.

This is very important. ML is a vast ocean.

Even some great researchers don't know **all the concepts fully.**
And you actually don’t need to digest all concepts.

Even if one knows all the concepts fully, his/her knowledge will not “full” after a week or two.

Because in ML, every week something new comes.

Keep updated yourself by reading the latest research papers.

Reading research papers is an art.
Sometimes, you need to read them at least 2–3 times to grasp the very core of it.

Try to understand what it is saying.

Avoid mathematical formulas at first, if you find it cumbersome. Just grasp the idea. Learn these concepts and apply them in projects and competitions.

You can keep up to date yourself in the cutting edge data science research by referring to the publications from top tier conferences such as ICML, and reading blogs such as “Import AI”.

If you don’t know how to know all the things about these top conferences, here is the best source to know more about each upcoming event in ML.

Doing ML alone can resist your growth.
Because you never know how this concept can be viewed in some other way also.

Here comes meet ups and tech-talks.

PyData is one of them.
PyData arranges various events and meetups around the world.

Join them if you can. You will definitely learn something new.

PyCon is also good (especially for those who prefer Python as their working language. Which many of us do).

Watch some success stories like this & this to encourage your self learning!!

Also, keep visiting Towards Data Science, Hacker Noon, Becoming Human like websites regularly.

All these blog sites have plenty of great blogs written by ML professionals. Also use **Twitter** wisely. Follow some great professionals there and never be late to catch new things.

At last, One important thing.

Don’t expect results quickly.

You can’t expect to understand and implement all the concepts in half a year..
Things will be understood as the time goes. Don’t compare yourself with anyone.

I personally don’t know many things about the AI field. **Knowing what you don’t know is also an important thing**.

Just be the best version of yourself. Everyone is unique.

And yes, you will need support when things are not going well. So, make a few besties with whom you can share everything including your achievements and sorrows. They will help you.

In short, If you never give up, ML is your cup of tea !!

10. Artificial Intelligence & employment

After seeing the potential of AI, what we can do using AI, one problem seems to emerge.
Loss of jobs.

As we start automation at the full scale in the industry, what will those people do who were doing that thing before?

This is a very serious problem. We can not or should not ignore this.
Many scientists & thinkers are trying to figure out this problem.

There's no denying that machines *will* be better than us in certain tasks.

Then why employers need to give salaries to humans & not buy a machine to the same job with better performance.

Let’s see some examples.

1. Self-driving vehicles.

There are millions of drivers out there.
Whether it's a bus, truck, car or bike. Their main source of income is driving.
Now, if we teach machines how to drive better than humans in every condition & use them in mainstream in day to day life, what will drivers do?

With self-driving vehicles, 1 other fields are also going to be disrupted.
Transportation.

Transportation is a multi billion dollar industry.
Trust me, if it gets disrupted by self-driving vehicles, a lot of things are going to change.

Autonomous driving is considered as one of the most revolutionary uses of AI in the real world.

2. Education.

Some companies are making robots & models which can give *personalized education* to almost every child.

Traditional schooling system is not very personalized.
There's one teacher for ~50 students.
So, the teacher can't pay enough attention to every child regularly. But machines can.

Machines have the potential to give personalized education to thousands of users simultaneously.

3. Customer service / experience.

AI has already begun to disrupt customer service.
According to a blog, 85% of all customer interactions will be handled without a human agent by 2020.

Usage of Chatbots is increasing day by day.
One of the biggest benefits of chatbots is that they can serve multiple customers at a time.
Their response time is faster.

Due to their ability to accurately understand what the customer is saying, sufficiently advanced NLP algorithms may replace customer support executives altogether.

4. Defence & Security

Advancements in autonomous weapons are also increasing.
Apart from autonomous weapons, image recognition and video recognition may be used for surveillance of the general population.

Governments have started using AI in security as well through CCTV cameras across public places across the country.

Such technology has already seen deployment in China, where widespread facial recognition algorithms are being used to create a **social credit system**.

In social credit systems, citizens are measured by some points, based on their actions, which are logged using AI-based cameras.

Some people also believe that machine learning may take some jobs but it'll create new jobs also.

There's a fascinating concept of Universal Basic Income(UBI) also. Which says the government should pay every living person some money regularly for doing nothing ! So that they can live as their jobs are automated by machines.

People are trying to find some ways to solve this problem.

But the problem of unemployment is not serious at this point of time. So, people are not talking about it seriously.

But there are chances that this problem will get bigger over time & some time, we need to tackle this problem.

As AI expert Andrew Ng puts it: "many people are doing routine, repetitive jobs. Unfortunately, technology is especially good at automating routine, repetitive work".

While AI won't replace all jobs, what seems to be certain is that AI will change the nature of work.

With the only question being how rapidly and how profoundly automation will alter the workplace.

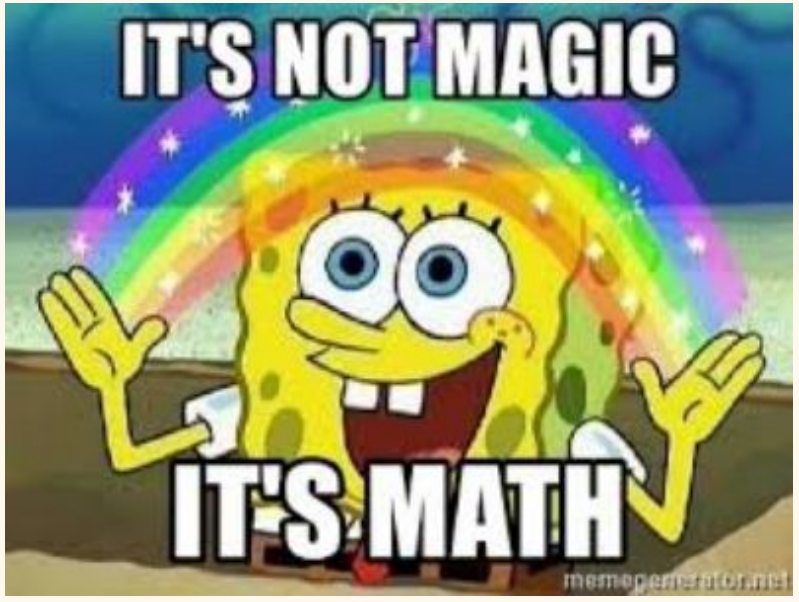
--
So, in short, there are chances employment & jobs will get affected once we start using machine learning systems in mainstream.

11. Pitfalls to avoid in using AI in businesses

Let’s see some things to keep in mind while making plans to use AI in your business.

1. AI is not magic.

This is a very common myth. *AI can not do everything.*
It’s not some magic pill which can solve every problem we want to solve.



AI at its core, is pure mathematics.

By seeing only +ve news about AI in news & social media, i**t's easy to assume that AI can do everything.**

That's not true.

It's not easy to train AI models.

So, one common pitfall to avoid is, don't assume AI can do everything.

2. Performance of AI models will degrade over time.

This is kind of counter intuitive.
Why will model performance degrade as time goes by?

For e.g. we build a model for fraudulent financial transactions.
Let's say we achieved 95% AUC (AUC is just a metric to measure model performance) on validation data.

And we deployed it for real world live financial transactions.
After a few months, model performance will most likely not be 95% AUC.

The reason behind this degradation of AI models is,

Real world is dynamic while AI models are static if we don't update them.

Patterns for fraud transactions which our model with 95% AUC performance have learned will not remain the same in future.
People will find different & innovative ways to make fraudulent financial transactions.

Same goes for almost all AI models.

Human behavior is dynamic. Models need to adapt to them to remain useful.

We unconsciously keep changing our daily patterns.
As we see social trends keep changing.

There are thousands of factors which applies to our day to day life but one thing for sure is,
Most of them will not remain *the same* in the long term.

That's why we need to retrain our AI models to allow them to capture new patterns.

3. Biases in our data can cause serious problems sometimes.

"Bias" in data means our data does not represent all the real world possibilities equally.
It is biased towards some specific type of data.

For example, the police department wants to make an AI model which can predict whether a person has committed some type of crime or not in the past just by seeing his/her face.

Now, let’s say there are more brown tone people in our data who have committed some crime.

Then our AI model will be more biased towards those people.
Like, if a person's skin color is brown, then there’s more chances of him/her having committed a crime.

That’s obviously not true.

But the model will think that skin of color is a more important pattern to capture in predicting whether a person has committed some crime or not.

This can cause serious problems.

4. Human help is still required.

As per the current state of AI field in general, it is not that capable of making decisions on itself. It needs human help very frequently.

Like,

Once training of AI model is done & we use it for real time predictions, maintaining those models is not easy.

To maintain performance, we continuously need to train our AI model with new data & need to make sure data quality is high. Otherwise performance will degrade.

It's unlikely that humans will cut out of the loop entirely. We will one or the other will depend on humans.

5. AI field is in a very early stage.

Despite what we see in the news & social media about AI & machine learning are performing better than human performance, let me tell you, the AI field is in very early stage.

It will take certain years or even decades to make things mature enough to beat humans.

Fundamental fact we don't see here is, we humans just have one single brain to do it all.

While in AI, we need to use multiple models to do different tasks (we have seen this in "*One machine can't do it all*" in limitations of ML)

So, it's good to keep in mind the limitations of the AI field while using it in day to day life.

Quiz time

Check your knowledge by asking these questions to yourself !
Answers are at the end of the book. But only check them after sincerely asking questions to yourself.

Q1. What's the main goal of using AI in business?

Q2. Before starting using AI in your business, what are the things you should have?

Q3. What is the most critical factor in the performance of AI models?

Q4. What are the things you should keep in mind before using AI?

Q5. What is that one thing which will help you in maintaining your high market share?

Q6. According to your knowledge of AI, order the tasks in *increasing order of difficulty* for AI models.

1. Training AI models to predict the share price of a stock after 10 weeks.
2. Training AI models to play a game of chess & beat a moderate level chess player.
3. Training AI models to predict whether this face is of male or female.
4. Training AI models to predict the age of a person by seeing his / her face.
5. Training AI models to translate a English sentence to French sentence.

Q7. What are those 3 things by which you can use AI in your existing products or services?

Q8. According to you, what matters more than the other one in data we have to train AI models? Quantity or quality or a mix of both is okay?

Q9. How can AI be leveraged to increase sales of a product?

Q10. What are the things in which AI can help to increase revenues?

So, we have discussed a lot of things about business perspective in Artificial Intelligence(AI) in this book.
Hope you have learned something.

But reading is not enough.

Make sure you also implement some of them according to your business domain.

Summary

We discussed the following topics in this book..

- What you will get by leveraging AI in businesses?
- What do I mean by “business perspective in AI”?
- Traditional businesses
- How to grow business perspective in AI?
- How can you leverage AI in your business?
- How to use AI in your existing products?
- How to maintain business perspective in AI?
- Real world use cases of AI
- How can you get started in AI & machine learning?
- Artificial Intelligence & employment
- Pitfalls to avoid in using AI in businesses
- Quiz

If you have learned at least one new thing from this FREE book,
Make sure you check out my distilled AI book as well.

Without requiring any math or computer prerequisites, you will get tons of knowledge about AI.
I recommend you to check it out if you want to get more info here.

Check out “Distilled Introduction of Artificial Intelligence” book

Topics this book covers are..

- What is data?
- What is Artificial Intelligence?
- What is Machine Learning?
- What is Deep Learning?
- What is Data Science?
- Why do we need Artificial Intelligence?
- Machine learning & Maths
- How does a machine “learn” to do things?
- How to monetize AI?
- How can you leverage AI in your business?
- How to use AI in your existing products / services?
- Real world use cases of Artificial Intelligence
- How can you get started with AI & machine learning?
- A realistic view of artificial intelligence
- Pitfalls to avoid in artificial intelligence
- Summary
- 10 questions to check your knowledge in AI & machine learning (with answers)

Learn more about this book here.

Check out "Distilled Artificial Intelligence" book

That book covers many more details than this book.
Here's the summary of that book

- What is data?
  - How to convert images, text & audio data into numbers?
- What is Artificial Intelligence?
  - Subfields of AI
  - Types of AI
- What is Machine Learning?
- What is Deep Learning?
  - What are artificial neural networks & how are they built?
  - What is "deep" in deep learning?
  - Advantages / limitations of Deep Learning.
- What is Data Science?
- Why do we need Artificial Intelligence?
  - Why does automation matter?
- Machine learning & Maths
  - Why is ML so dependent on Maths?
- Types of machine learning
  - Supervised learning
    - Classification

            - What are decision trees & how do they work?
        - Regression
    - Unsupervised learning
        - Clustering
        - Dimensionality reduction
    - Semi-supervised learning
        - Pseudo labeling
    - Self-supervised learning
        - Language models in NLP
    - What is a metric? Why do we need it?
- How does a machine “learn” to do things?
    - What is overfitting & underfitting?
    - What is a loss function? Why do we need it?
    - What is gradient descent?
    - How does the machine see images?
    - How does the machine read & “understand” texts?
    - How does the machine listen to audio?
- How does a neural network “learn” to do things?
    - What is back-propagation?
    - What are “weights” in a neural network? What’s their role?
    - Why do we need a “deep” network or multiple layers in a neural network?
- What is Reinforcement learning?
    - What is reward in reinforcement learning?

    - Real world examples of reinforcement learning
- What is transfer learning?
    - Why do we need it?
    - Intuition behind transfer learning
    - How do we use transfer learning in deep learning?
- What is Computer Vision?
    - Why do we need computer vision?
    - How does a machine capture patterns in images?
    - Problem types in computer vision
        - Image classification
        - Image detection
        - Image segmentation
    - Downsides / flaws of computer vision
        - Adversarial attack
            - Why do neural networks make these mistakes?
- What is Natural Language Processing (NLP)?
    - How does the machine read & find patterns in text data?
    - What are word embeddings? What's their role?
        - How do we get word embeddings?
    - "Attention" mechanism in NLP
    - Text cleaning & preprocessing
    - Ensemble in NLP
        - Why do we need ensembles?

        - How do we do ensemble?
- Genetic algorithms in ML
    - 6 steps of Genetic algorithms
    - Real world applications of genetic algorithms
- Generative Adversarial Networks (GANs)
    - What makes GANs so interesting & popular?
    - Preview of things which GANs have done till now
    - How GANs work?
- Recommendation
    - How do recommendation systems work?
        - User based recommendation
        - Item based recommendation
    - Association rule mining
- How do AI / ML projects work in the real world?
    - Steps professionals follow to make good predictive models
    - What does a typical ML project pipeline look like?
    - What is feature engineering?
- How to monetize AI?
    - Traditional non-technical businesses
        - Limitations of traditional non-technical businesses
        - How computers & AI can remove those limitations
    - Benefits of automation
    - 3 main things AI can do to generate profits

        - Create new products (to increase revenues)
            - Real world examples
        - Improve existing ones (to increase revenues)
            - Real world examples
        - Automate processes (to decrease costs)
            - Real world examples
    - After growing, how to maintain dominance in the market?
        - Real world examples
- How can you leverage AI in your business?
    - What are the typical things you will need if you want to leverage AI technology in your business?
        - High quantity & quality data
        - Best talent who knows AI
        - Domain expertise
- How to use AI in your existing products / services?
    - Things you can do in your existing products that can increase the profits.
        - Automating the most time & cost consuming part of the process.
        - Increasing sales or user engagement with the product using data we already have.
        - Adding new AI backed features in our existing products.
- Real world use cases of AI
    - Netflix recommendation
    - Self-driving vehicles
- Limitations & advantages of machine learning

    - Advantages
        - Automation
        - Speed
        - Performance
    - Limitations
        - One machine can’t do it all
        - Lake of explainability
        - It’s not that hard to fool machine
- How can you get started with AI & machine learning?
    - How to start?
    - How to grow?
    - How to maintain it?
- A realistic view of artificial intelligence
    - Filtering out the noise, created by social media & news channels.
- Artificial intelligence & employment
    - Fields that can be disrupted by AI
        - Education
        - Customer service / experience
        - Defence & security
- Pitfalls to avoid in artificial intelligence
- 10 questions to check your knowledge in AI & machine learning (with answers).

See preview of the book here. I recommend you to check it out; it covers tons of concepts of AI.

About the author

Hi there, my name is Prashant Kikani.

I am a professional data scientist working in Bangalore, India.

I also spend some time in Kaggle(world's largest data science community) competitions & Kernels with **rank** in **top 1% & top 0.1% worldwide** respectively. Check out my profile.

Artificial Intelligence is indeed one of the most fascinating technologies of the 21st century. Big companies have already started using the benefits of AI in their products & services.
With that said, basic knowledge about AI becomes very essential for everyone.

My goal of writing this book is to share my knowledge about AI & machine learning with everyone; especially those who don't have much background in computer science & mathematics.

I have tried to explain all the concepts in easy & non-technical language. Hope you learned something new from this book.

Here is my interview with a career guidance organization.

I will be very happy if you share whatever you have learned in this book with me.

My email is prashant@distilledai.com.
I always reply to my mails by myself.

Here are my social media handles. You can always contact me for any AI or ML related doubts.

Happy learning,
Prashant Kikani

Answers of the quiz

A1.
Automation. To make things operate on their own so that we can work on something more important.

A2.
Good quality data & an experienced AI team(2-5 people is also fine).

A3.
Quality data. Quantity also matters but slightly less than quality most of the time. Without good quality data, no good algorithm will work.

A4.
AI is not magic. Model performance degrades over time. Data should be unbiased.

A5.
Competitive moat. One thing that is very hard to copy.

A6.
Correct order will be,

1. Training AI models to predict whether this face is of male or female.
2. Training AI models to predict the age of a person by seeing his / her face.
3. Training AI models to translate a English sentence to French sentence.

4. Training AI models to play a game of Go(a board game) & beat a pro level player.
5. Training AI models to predict the price of bitcoin after 10 weeks.

A7.
Here are those 3 things.
1. Automating the most time & cost consuming part of the process.
2. Increasing sales or user engagement with the product using data we already have.
3. Adding new AI backed features in our existing products.

A8.
Quality matters slightly more than quantity in most of the cases.

A9.
Demand forecasting. Predict the demand of the product & store them in warehouses.

A10.
Making new products & improving existing ones.

See you in the next subsequent books !
You can see a preview of them here.

Happy learning !