

MID-CAREER TRANSITION TO ARTIFICIAL INTELLIGENCE

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Outline

① BACKGROUND

② INTRODUCTION

③ ROLES

④ MID-CAREER

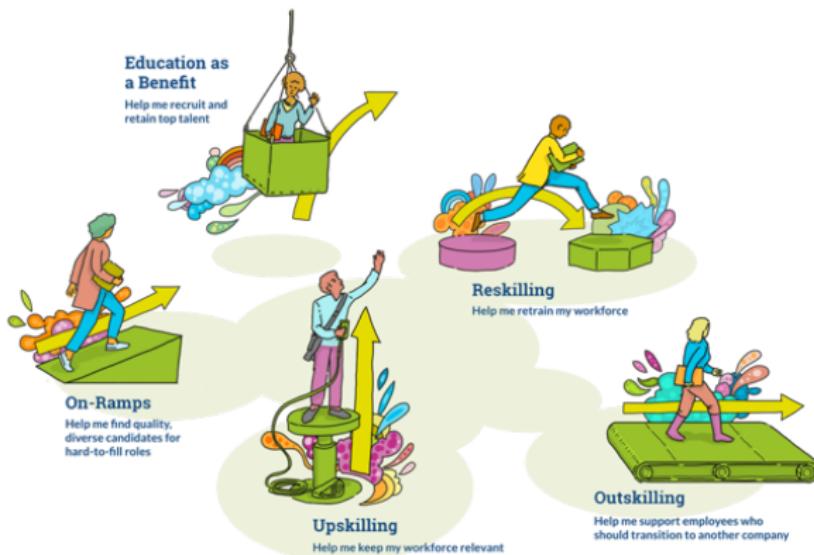
⑤ PREPARATION

⑥ REFERENCES

Career in AI: Background

Current State

- ▶ 44% of US workforce < \$18K/yr (< poverty line), works 80-100 hrs/week
- ▶ Automation CAGR 7% (as per BCG), to reach \$114B by 2025



(Ref: As Pressure To Upskill Grows, 5 Models Emerge – Forbes.com)

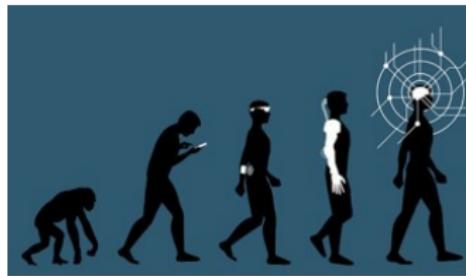
Examples

Less mechanical, automatable

- ▶ Bill and account collectors
- ▶ Data entry operators
- ▶ Computer network support
- ▶ Administrative assistants
- ▶ Insurance sales agents

More Cognitive, Creative, Human

- ▶ Software developers
- ▶ Human resources managers
- ▶ Psychologists
- ▶ Sportsman
- ▶ Nurses, care



(Source: The Simplistic Debate Over Artificial Intelligence – Preston
Estep)

Changes

Technological

- ▶ AI deluge
- ▶ Digitization → Data + APIs
- ▶ Remote *

Social

- ▶ Over interaction + isolation
- ▶ Obsolete roles, emergence of new
- ▶ Lifelong re-skilling



(Source: Rise of the Chatbots: How AI Changed Customer Service – Salesforce.com)

Financial

- ▶ Widening gap
- ▶ Flatter world
- ▶ Gigs over jobs

Data Science — Artificial Intelligence is critical in bringing intelligent automation

What are Data Sciences?
What is Artificial Intelligence?
What is Machine Learning?
What is Deep Learning?

What is Data Science?

- ▶ Science of Data (obviously)
- ▶ Use of Data for Applications
- ▶ Some parts of AI uses Data to find patterns and insights which are helpful in multiple applications
- ▶ Machine and Deep Learning that part of AI that leverages data.

So, more on AI-ML soon ...

Introduction to Artificial Intelligence

“Houston, we have a problem!!”



50 Years Ago: “Houston, We’ve Had a Problem” – John Uri

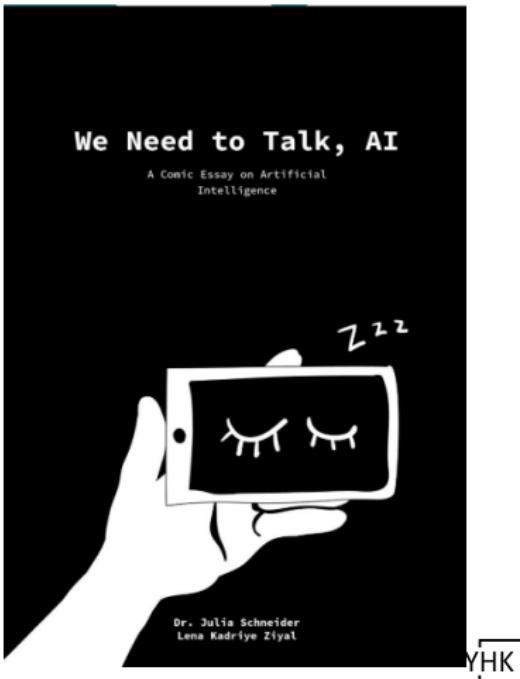
YHK

The Problem

Every company is claiming to be working in AI-ML

- ▶ Is it really so?
- ▶ What exactly is AI (ML)?
- ▶ What is not AI?

Or is it just a plain BIG hype?



What is the Core Idea?

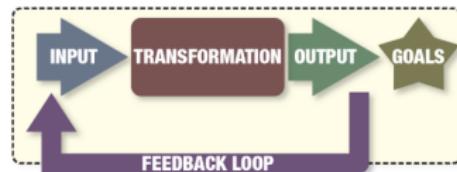
What's the core idea?

- ▶ behind problem solving?
- ▶ behind writing software algorithms?
- ▶ solving research problems?



Desire

- ▶ To find a “function”
- ▶ To find a relation
- ▶ To find a transformation
- ▶ To build a model
- ▶ From given inputs to desired outputs.
That's it.



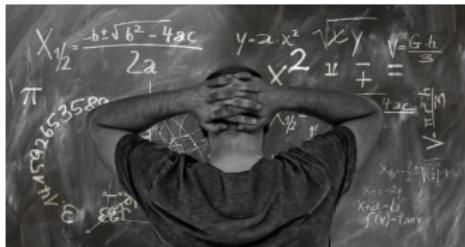
Functions

- ▶ Some functions are straight forward
- ▶ *"In summer, ice-cream sale goes up"*
- ▶ Cause and effect
- ▶ Relation (function, Mathematical model) is found out
- ▶ Here, simple rule based programming suffices



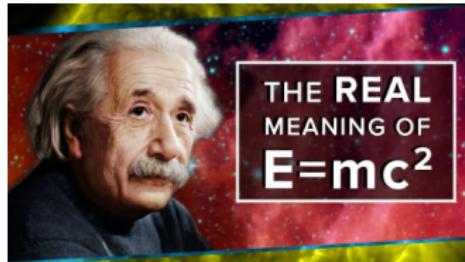
Functions

- ▶ But some functions are complex
- ▶ *"More you put efforts, your business flourishes."*
- ▶ Cause and effect again, but the relation is far too complex
- ▶ Too many variables
- ▶ Here, simple rule based programming not humanly possible.
- ▶ Lots of research needed to come up with equations.



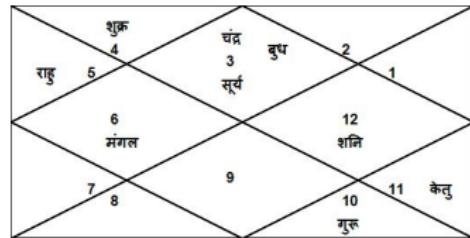
Functions

- ▶ $E = mc^2$
- ▶ What's this? a function?
- ▶ Input variable(s)?
- ▶ Output variable(s)?
- ▶ Parameters?
- ▶ How's the relation? linear?



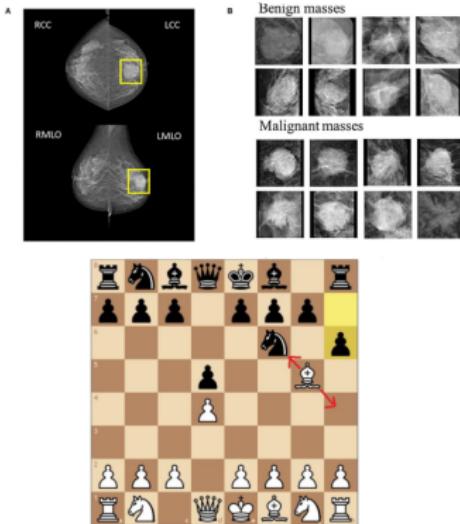
Controversial Example

- ▶ Even astrology is a model, based on the past cases.
- ▶ Could claim empirical evidence.
- ▶ Given this planetary position, it predicts.
- ▶ Represented by "Horoscope"
- ▶ Got weights for each planets (real or fictitious)
- ▶ Reliable??



Functions

- ▶ But most real-life functions are not deterministic
- ▶ Some are probabilistic, some non-linear.
- ▶ “*Detecting if the tumor is benign or malignant*”
- ▶ “*At any state in the game of chess, what's the next move?*”



Chess: next move?

- ▶ Needs extreme expertise
- ▶ Needs “intelligence”
- ▶ How do you get that?
 - ▶ Built by lots of training.
 - ▶ By studying lots of past games.
- ▶ This is how Humans build intelligence



Intelligence

- ▶ Can machine (software/program) also do the same?
- ▶ Can it play chess?
- ▶ Can it build intelligence?
- ▶ By looking at past experiences (data),
- ▶ Training Data: games played, moves used, etc.

Yes, it can!! That's Artificial Intelligence.



What is Artificial Intelligence?



My definition

“If machines (or computer programs) start doing some/all of these “intelligent” tasks, then that’s Artificial Intelligence”

Intelligence: the differentiation

- ▶ Ability to think various domains
- ▶ Ability produce something new
- ▶ Ability to detect the unseen
- ▶ Ability to enhance knowledge (rules, patterns)



All these, AI has started doing. The AI era has arrived!!

Everyday usage

Artificial intelligence seems to have become ubiquitous.

- ▶ Replying to our emails on Gmail
- ▶ Learning how to drive our cars,
- ▶ Sorting our holiday photos.
- ▶ etc.



Too good to be true, isn't it, sort of Magical !!

But then ...

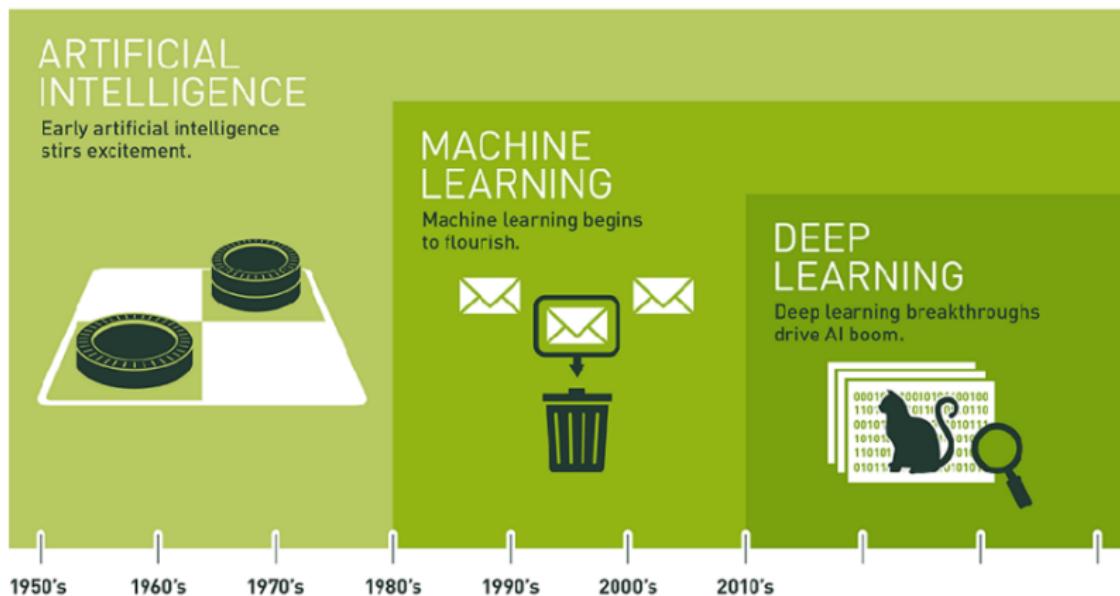
- ▶ When its too good, you start suspecting
- ▶ Is it for real!!
- ▶ How can such thing happen?
- ▶ How far will it go?



The next thing you know, people are worrying about exactly how and when AI is going to doom humanity.

AI, ML, DL ... Same?

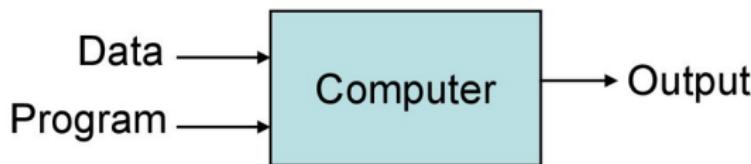
Or Relationship between them ?



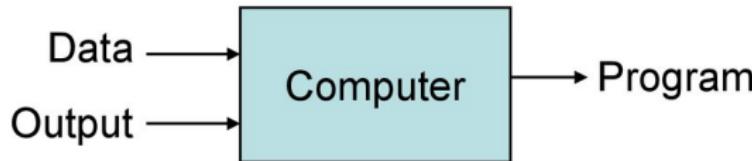
(Ref: <https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/>)

Traditional vs. Machine Learning?

Traditional Programming



Machine Learning



Why Machine/Deep Learning?

- ▶ Problems with High Dimensionality
- ▶ Hard/Expensive to program manually
- ▶ Techniques to model 'ANY' function given 'ENOUGH' data.
- ▶ Job \$\$\$

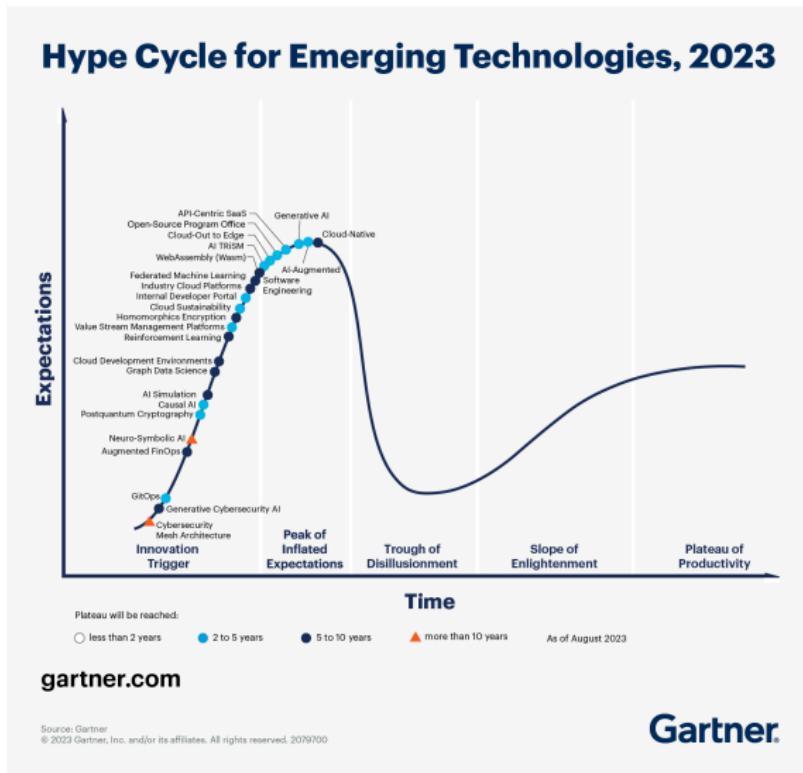


Why now?

- ▶ Flood of data (Internet, IoT)
- ▶ Increasing computational power
- ▶ Easy/free availability of algorithms
- ▶ Increasing support from industries



Gartner Hype Cycle Emerging Technologies 2023



Is AI a threat?

Is AI a threat?

If you believe in what Elon Musk says, then YES.



Elon Musk recently commented on Twitter that artificial intelligence (AI) is more dangerous than North Korea

(Ref: What is Artificial Intelligence — Artificial Intelligence Tutorial For Beginners — Edureka)

Is AI a threat?

If you believe in these movies, then YES.



The Terminator



I, Robot



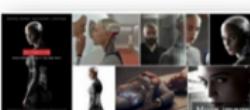
The Matrix



Tron: Legacy



War Games



Ex Machina

Well, AI based War robots are not impossible anymore.

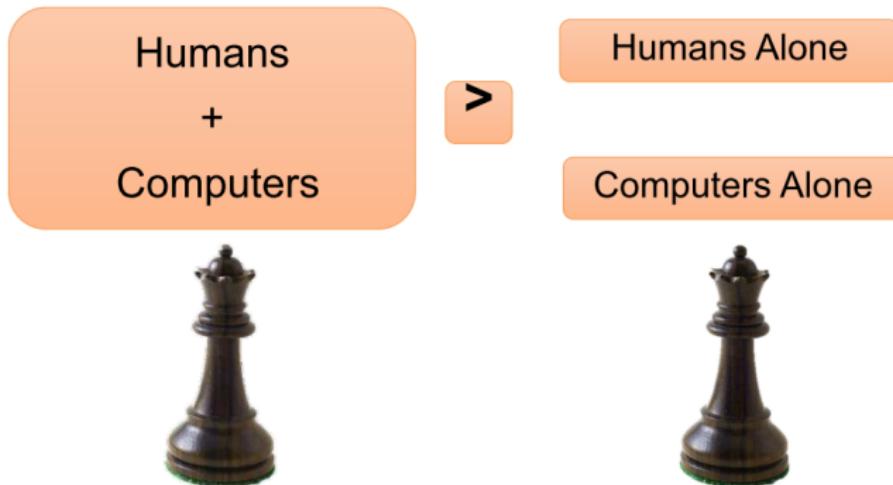
(Ref: What is Artificial Intelligence — Artificial Intelligence Tutorial For Beginners — Edureka)

Fear: Are we being replaced?

- ▶ Yes. in tasks that are repetitive
- ▶ But not which require complex thinking and creativity

Mostly

Technology Enhancing (Not Replacing) Humans



(Ref: "Artificial Intelligence Overview" - Harry Surden)

Limits on Artificial Intelligence

- ▶ Many things still beyond the realm of AI
- ▶ No thinking computers
- ▶ No Abstract Reasoning
- ▶ Often AI systems Have Accuracy Limits
- ▶ Many things difficult to capture in data
- ▶ Sometimes Hard to interpret Systems

Finding Your Persona . . .

Choosing Your Persona for Transition to Data Science

The USER Persona

- ▶ Leverage domain expertise.
- ▶ Utilize low/no code platforms like Weka or Knime.
- ▶ Build machine learning workflows easily.
- ▶ Ideal for managers, marketing professionals.
- ▶ Make data-driven decisions without extensive coding.



The DEVELOPER Persona

- ▶ Technical enthusiast with a programming flair.
- ▶ Expertise in scikit-learn, TensorFlow, PyTorch.
- ▶ Develop robust data science applications.
- ▶ Dive deep into machine learning techniques.
- ▶ Transform ideas into impactful solutions.



The RESEARCHER Persona

- ▶ Passionate about mathematics and innovation.
- ▶ Invent new techniques, contribute to research.
- ▶ Caters to deep R&D professionals, PhD holders.
- ▶ Shape the data science landscape with created libraries.
- ▶ Be at the forefront of groundbreaking discoveries.



Choosing a Persona

- ▶ Select a persona based on skills and interests.
- ▶ Allow projects and interests to guide your journey.
- ▶ Explore new areas of expertise.
- ▶ Expand your skill set accordingly.
- ▶ The right persona empowers excellence and lasting impact.



Career in AI: But . . . , But . . . , How to prepare?



What got you here, won't get you there!!
- Marshal Goldsmith

So, Well, you can't prepare!!
not everything, but certainly, specifically ...

Are you suitable?

Advantages:

- ▶ Domain Expertise
- ▶ Maturity, Communication, Soft Skills
- ▶ Problem Solving

Dis-advantages:

- ▶ Lost touch with Mathematics
- ▶ Un-Learning and Re-Learning inertia
- ▶ Starting from scratch? Seniority?



Why do you want to Switch?

- ▶ $\$_1 \$_2 \$_3 \dots \$_n$?
- ▶ Will remain in fashion forever?
- ▶ Hate my current job? no growth?



What's in it for me?

Current + ML combo?

- ▶ First : DON'T QUIT!!!
- ▶ Don't lose advantage due to domain expertise
- ▶ ML just another problem solving technique, IF DATA IS AVAILABLE
- ▶ Can you leverage domain expertise and apply ML there, a good/smooth transition?



More Generally . . . For Career . . .

Ikigai



(Source: How To Find Your Ikigai And Transform Your Outlook On Life And Business - Chris Myers)

Generic Gyan

Specific Knowledge

- ▶ Unique, rare combination
- ▶ Un-trainable, un-scalable
- ▶ Acquired through apprenticeship

Leverage

- ▶ Permission-ed: Capital, Labor
- ▶ Un-permission-ed: Content, code
- ▶ Marginal cost of duplication

Wealth is a positive sum game

Foreword by
TIM FERRISS

THE
ALMANACK
OF
NAVAL
RAVIKANT

A guide to wealth and happiness
ERIC JORGENSEN

Own story

- ▶ Current jobs were not available 10 yrs back
- ▶ Pick difficult problems/domain, Job, RnD
- ▶ If not now, can change later, Mid career change, harder, but possible.

Learning Path, Roadmap

Resources

- ▶ First : try Free Online resources, see how much you grasp
- ▶ No expensive (read, fees in lakhs) certification courses, to start with
- ▶ Test waters, gain some understanding of yourself then decide.

Start Playing the Role

- ▶ Wish to be a Data Scientist? Start playing that role today.
- ▶ Take specific actions to embody the desired role.
- ▶ Tone of the suggestion: Begin playing the coveted role immediately.

Build Foundation

- ▶ Take courses in necessary mathematics, programming, ML, and DL.
- ▶ Engage in assignments to solidify foundational knowledge.
- ▶ Lay the groundwork for a strong understanding of key concepts.

Kaggle Competitions

- ▶ Participate in Kaggle competitions across various domains.
- ▶ Explore NLP, Image Processing, Time-Series, and more.
- ▶ Gain practical experience and exposure to diverse challenges.

Specialize and Apply

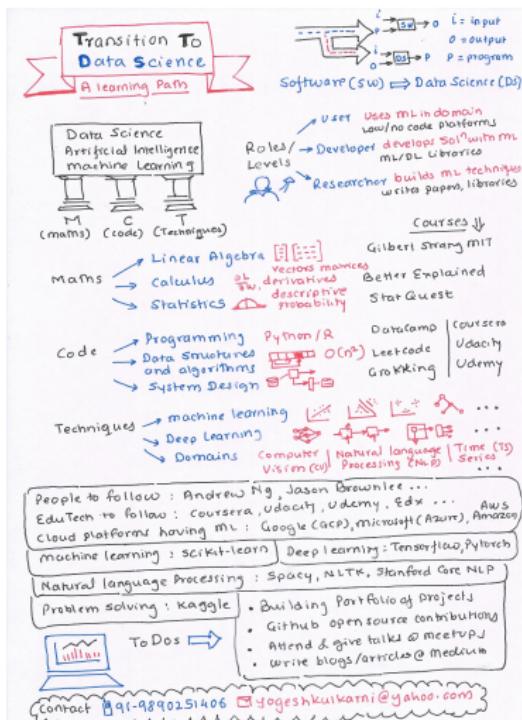
- ▶ Choose a specific area, e.g., NLP, and go deep into it.
- ▶ Apply your expertise to problems from different domains (legal, medical, etc.).
- ▶ Develop a comprehensive and specialized skill set.

Build a GitHub Portfolio

- ▶ Showcase your work, courses, and projects on GitHub.
- ▶ Portfolio serves as a self-assessment tool and demonstrates your grasp.
- ▶ Discuss it during interviews, providing concrete evidence of your skills.
- ▶ Your GitHub repo is your real resume – proxies like education and gender matter less.



My Sketchnote



(Ref: How to become a Data Scientist? - Yogesh Kulkarni)

Summary Steps

Prep:

- ▶ Mathematics: Statistics, Calculus, Linear Algebra
- ▶ Programming: Python, Data Structure & Algorithms, Tools
- ▶ ML/DL: algorithms & frameworks
- ▶ Practice: Kaggle, Hackathons, projects on Github, blogs, Meetups-talks, etc.



Analytics Vidhya Learning Path 2017

- ▶ An year long schedule
- ▶ Mostly free resources
- ▶ Followed it myself
- ▶ Separate paths for:
 - ▶ Beginner: Not much experience in programming but just college maths
 - ▶ Transitioner: Decent experience programming, but no ML and just college maths
 - ▶ Intermediate: Knows ML, comfortable with programming and maths.

<https://www.analyticsvidhya.com/blog/2017/01/the-most-comprehensive-data-science-learning-plan-for-2017/>



Career in AI: References

References

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- ▶ What is Data Science? - SimpliLearn
- ▶ Roadmap: How to Learn Machine Learning in 6 Months - Zach Miller, Senior Data Scientist at Metis
- ▶ Tetiana Ivanova: How to become a Data Scientist in 6 months
- ▶ How to switch career to data science from non computer science background - Codebasics
- ▶ Step by step roadmap for machine learning engineer - Codebasics

Thanks ...

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