Google Developer Groups

IIITM Gwalior

Day 2:
AI-ML Session

Kushal Trivedi

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A little bit ‘bout ourselves...

- Ex - SRF @ IIT KGP
- Ex - RI @ Makdesign
- Broadly interested in everything about AI and Computers
- Music, music, music

- Upcoming Intern @Fibe
- SIH 24’ Winner
- Curious at the intersection of mathematics, physics and CS
- See me play football everyday!

Fun Fact: We have been friends since the 5th, i.e. 2015, ~11 years!

Shameless promotion...

Kushal

Murtuza

Our topic of discussion today?

- **A general discussion**
  (i. What is AI? & ii. A Roadmap to begin & iii. Mistakes to avoid)
- “The first topic” of AI **=> Linear Regression**
- Our favorite topic **=> Style Transfer/ Image Generation/ Video Generation**

Roadmap to Learning AI (Our take...)

- **A basic-to-good grasp on Math (especially for research)** [~10-15 days]
  - 1st year courses would do (Linear Algebra/ Calculus/ Probability/ Statistics)
- **Learn Python (please!)** [You could spend a month]
  - Start with NumPy/ Pandas/ Matplotlib/ Scikit Learn/ Seaborn (optionally)
- **Start with Machine Learning or Data Science** [~1 month]
- ***Only if you are interested*, go ahead with Deep Learning** [~1-2 months]
- **Pick a niche: Computer Vision/ Natural Language Processing/ Robotics etc.** [No timeline]
- **Find your own path!**

Roadmap to Learning AI (Extd.)

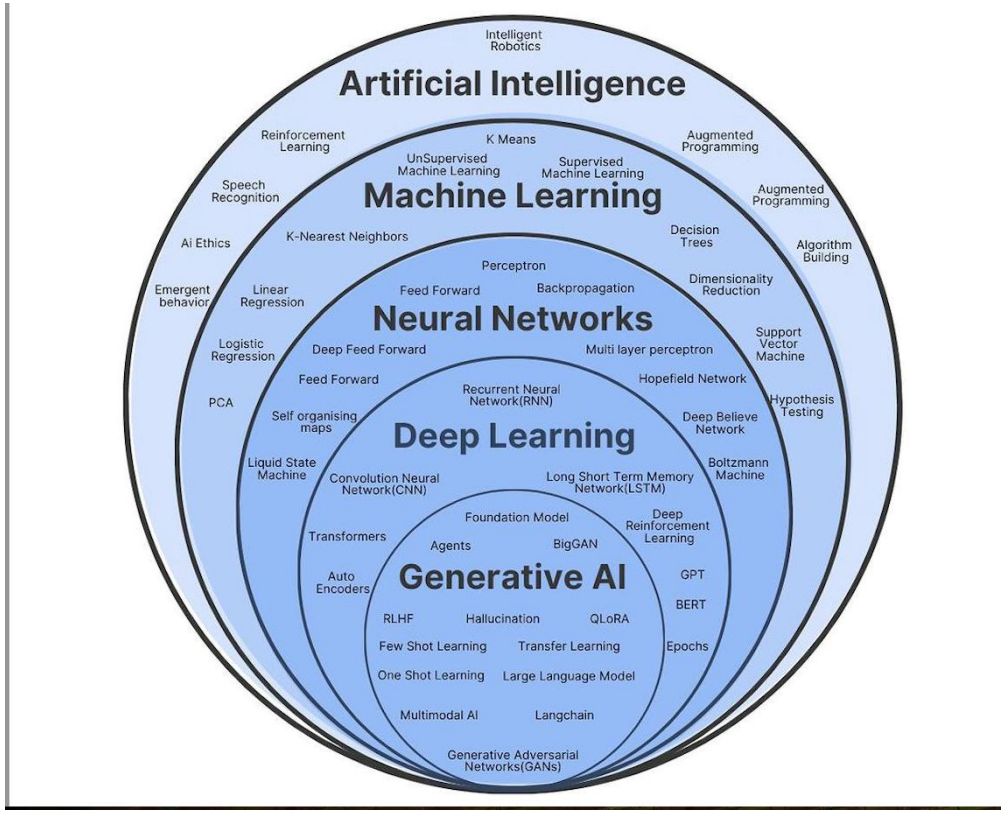
Which Channels to Follow?!

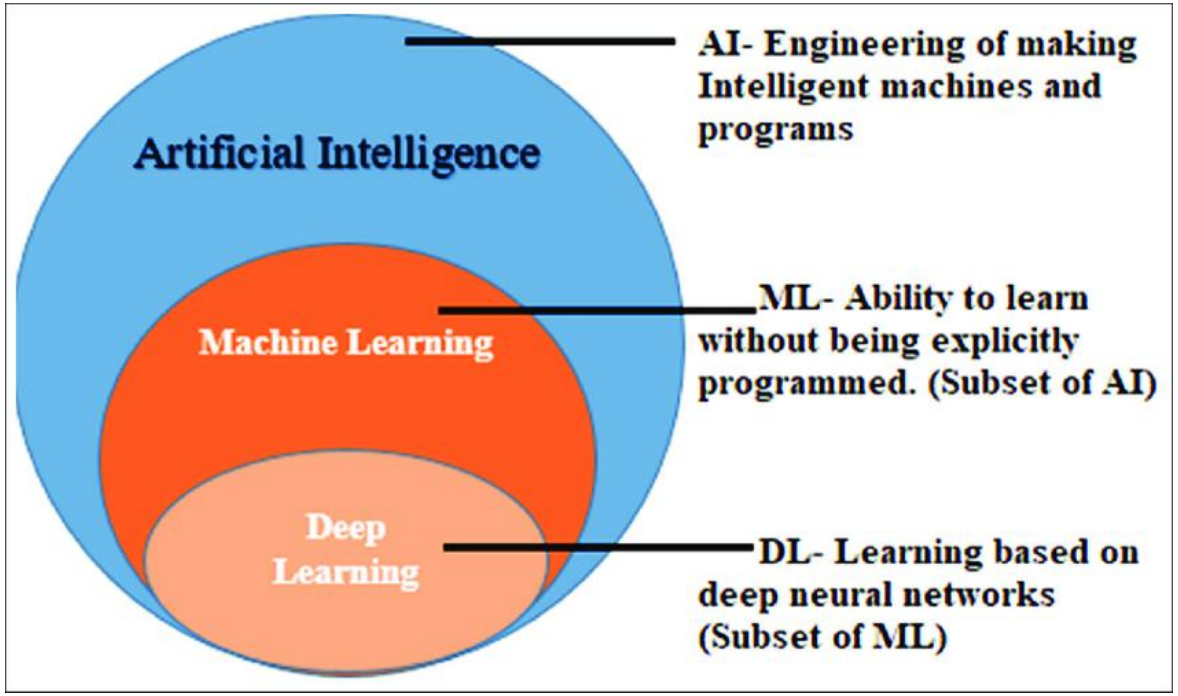
- **Andrew Ng** (Stanford lecs/ Coursera lecs)
- **Krish Naik**
- **StatQuest**
- **Codebasics** (Python Libraries)
- **CampusX**
- **Nicholas Renotte**
- **Andrej Karpathy** (One of the ex-founding engineers @ Tesla, OpenAI)
- **MIT/ Stanford or any other top colleges' AI playlists**
- **Books, books, books!** (My favorite publication: O'Reilly)

Mistakes I Did, and The Best Things I Did

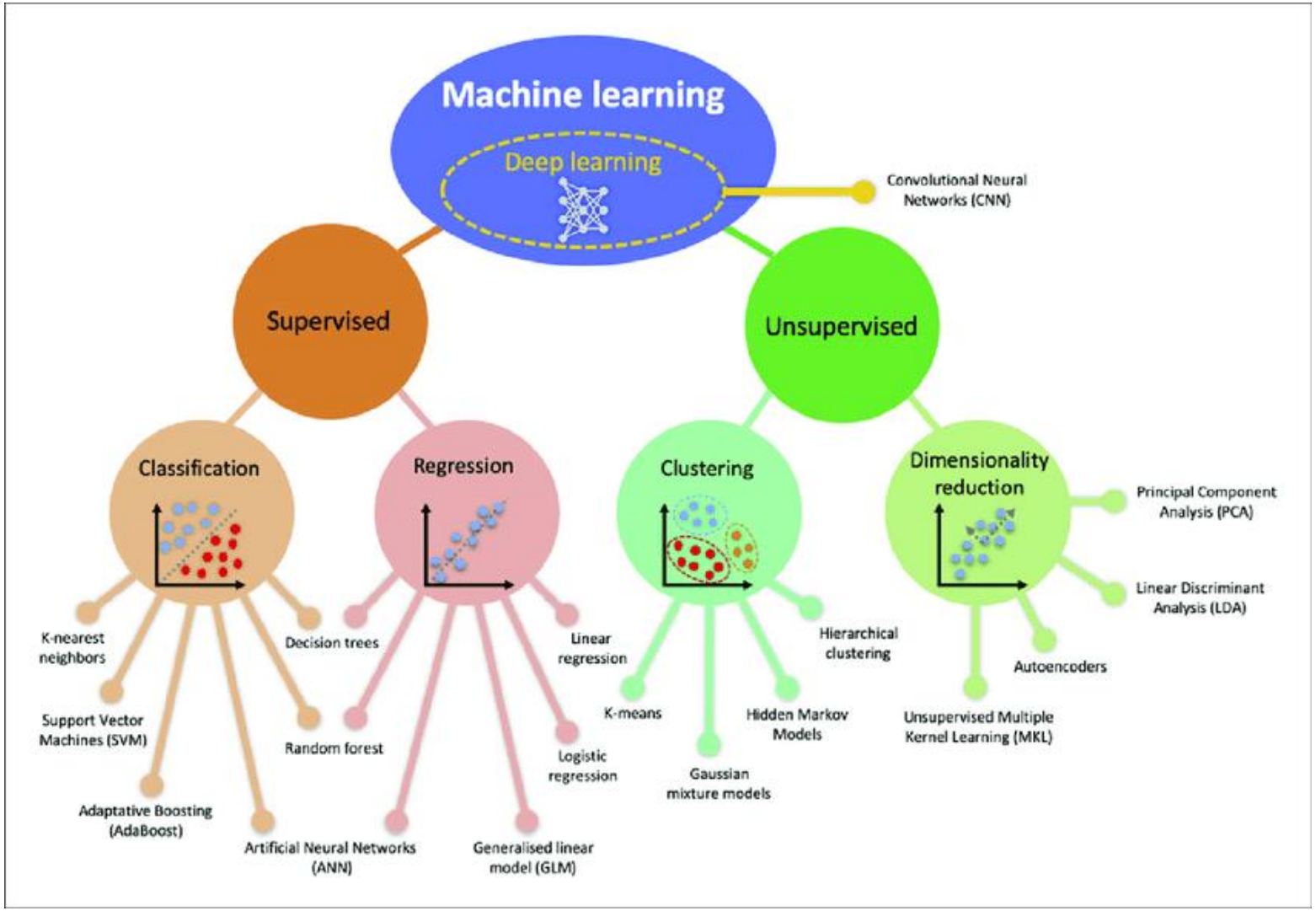
- **The general way of learning: theory (please understand the math) => code => proceed** [Do not just focus on either, avoiding the other one]
- **It is overwhelming, be patient, do not rush with the concepts! This is CS + Natural Sciences.**
- **Read papers!** Even if you just focus on the engineering aspect, read the main ones.
- **Build good projects! Contribute to open source, contribute to research!**
- **Showcase your work, keep failing.** [Non-technical, but very imp.]

So, What is Artificial Intelligence/ Machine Learning/ Deep Learning?

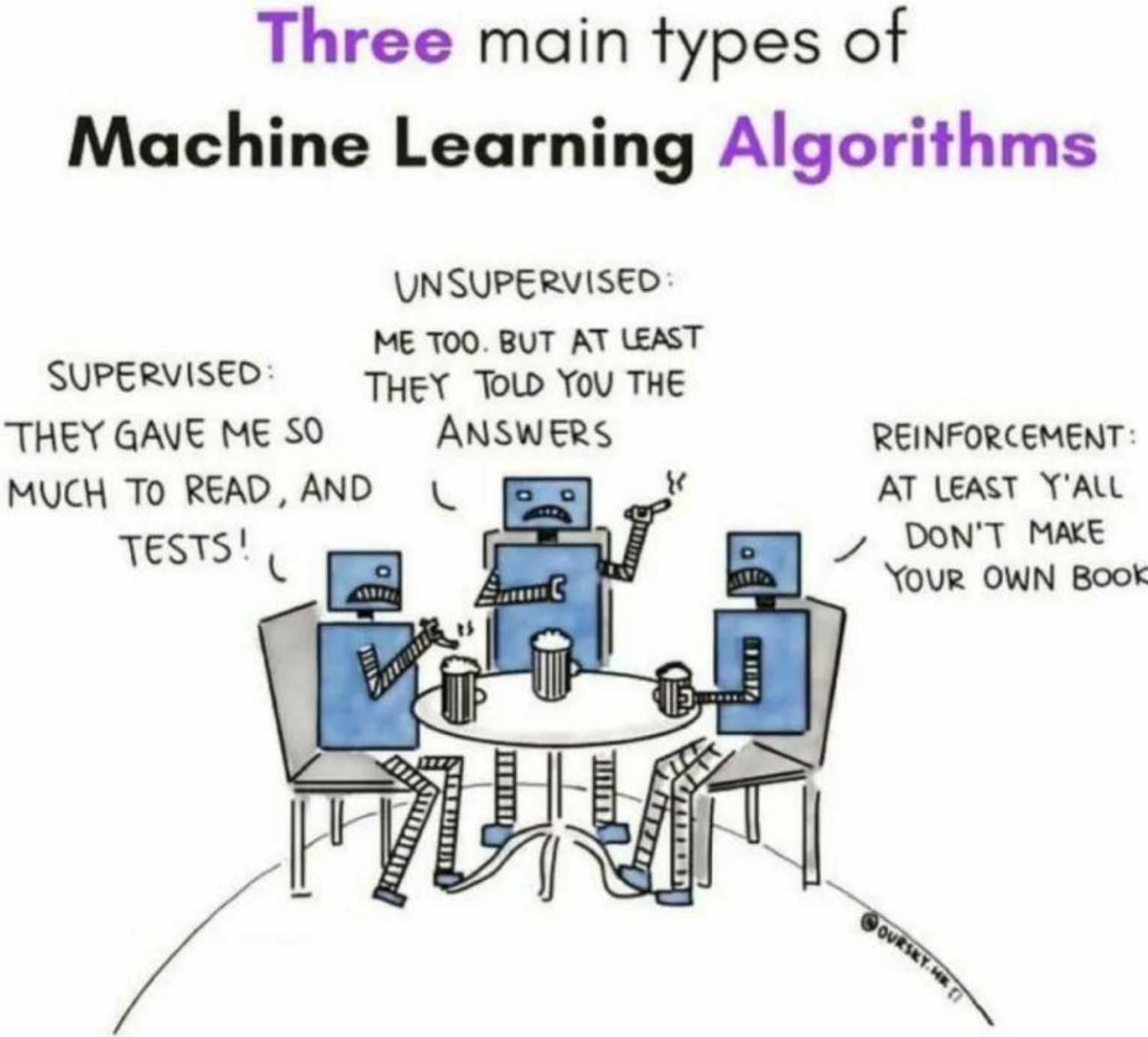




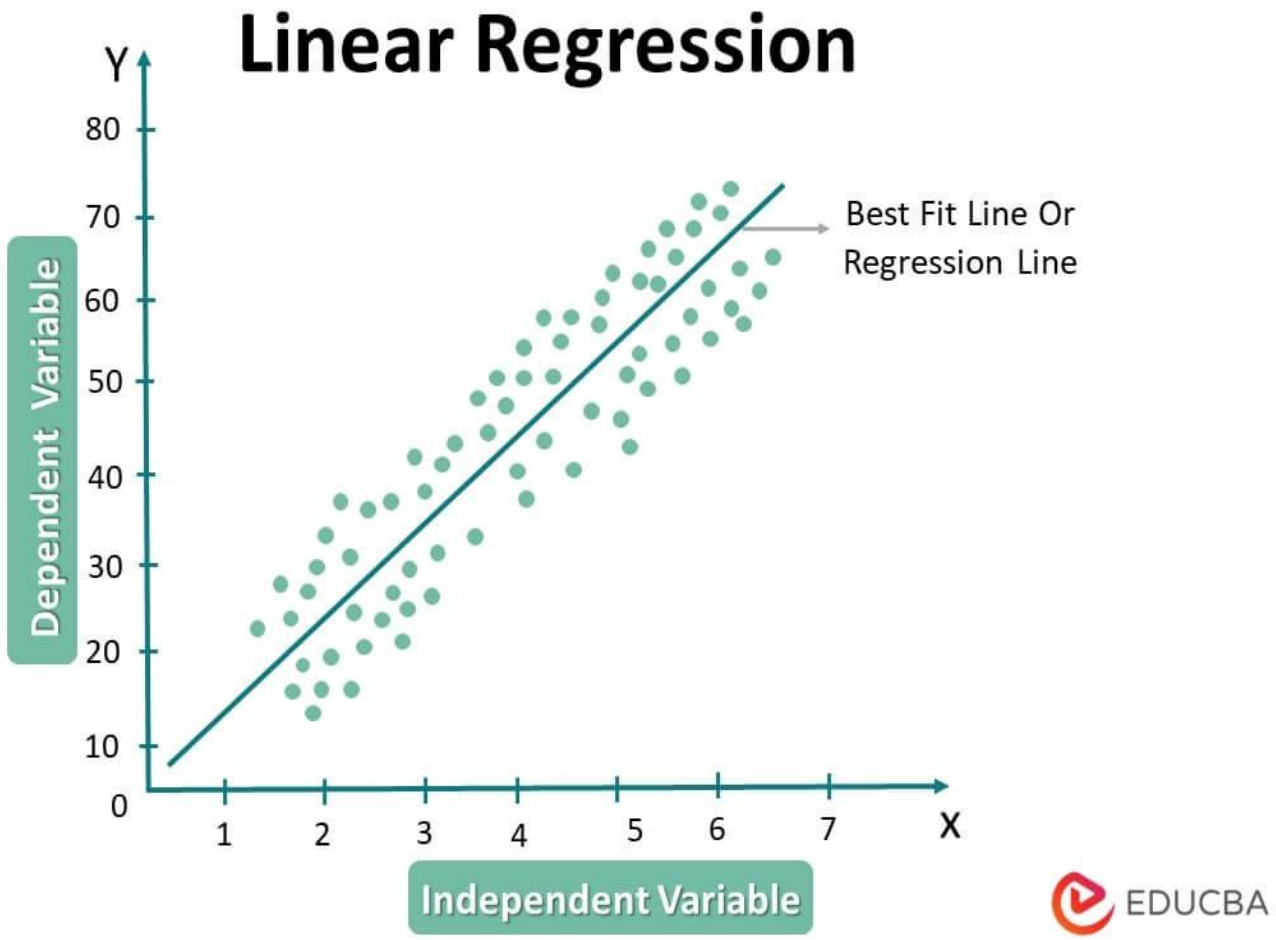
Machine Learning



Meme.


Three main types of
Machine Learning Algorithms
SUPERVISED:
THEY GAVE ME SO MUCH TO READ, AND TESTS!
UNSUPERVISED:
ME TOO. BUT AT LEAST THEY TOLD YOU THE ANSWERS
REINFORCEMENT:
AT LEAST Y'ALL DON'T MAKE YOUR OWN BOOK

Giving a rough idea...



Regression is modelling the relationship between independent and dependent variables

If the relationship is linear or you require it to be linear, naturally it is called **Linear Regression**!

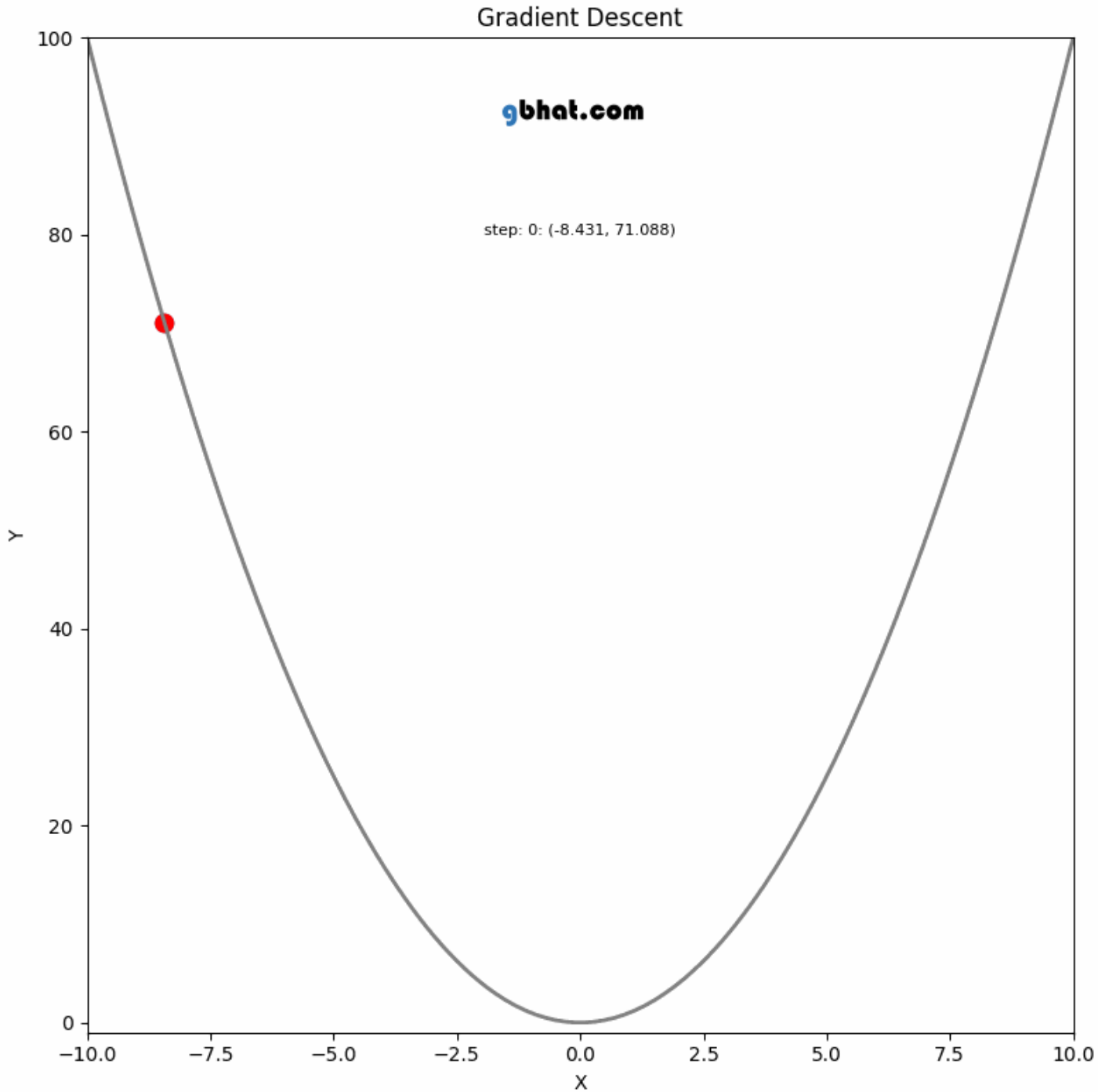
Example: Keep this in mind!

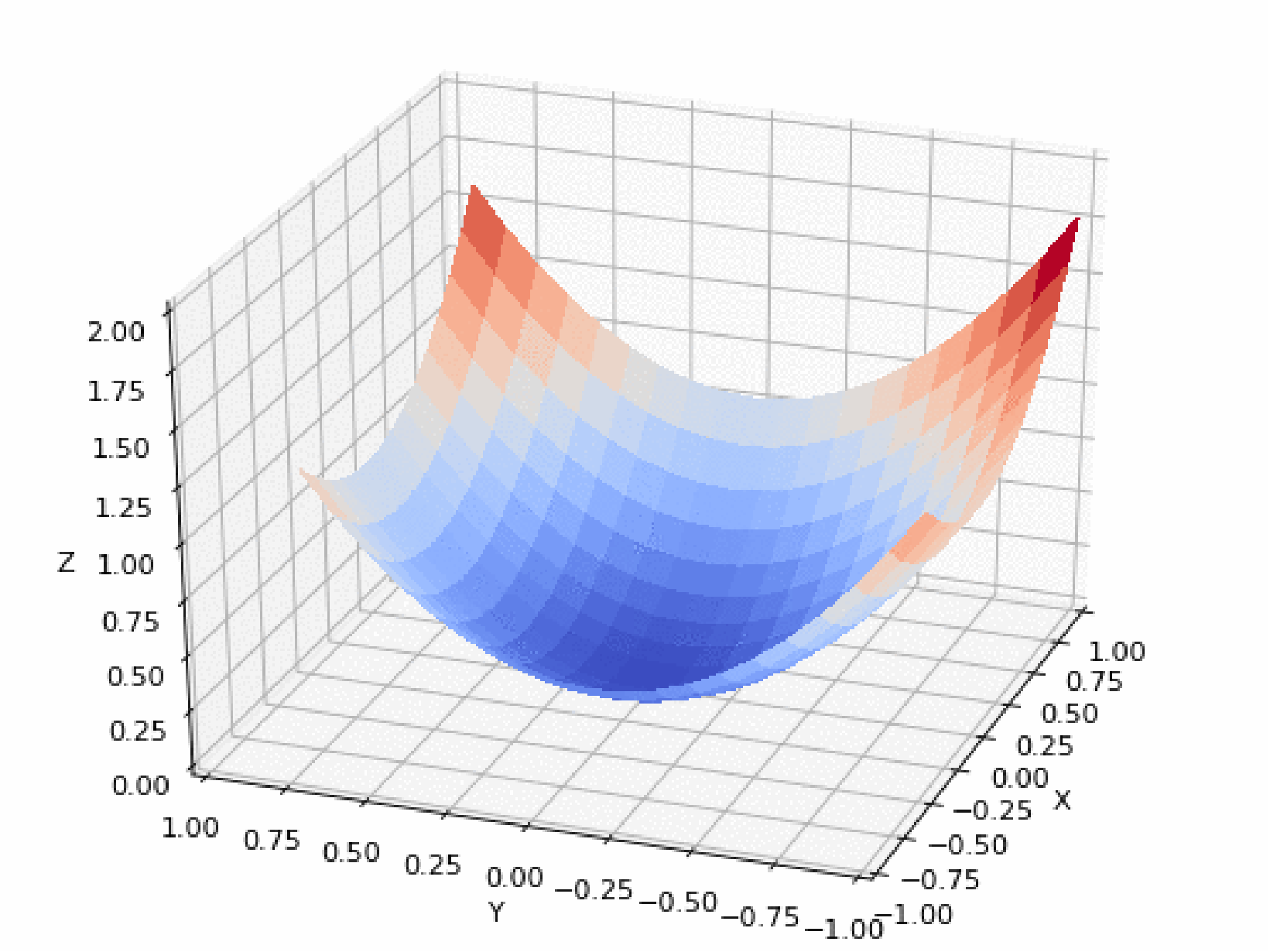
age	sex	bmi	children	smoker	region	charges
19	female	27.9	0	yes	southwest	16884.92
18	male	33.77	1	no	southeast	1725.552
28	male	33	3	no	southeast	4449.462
33	male	22.705	0	no	northwest	21984.47
32	male	28.88	0	no	northwest	3866.855
31	female	25.74	0	no	southeast	3756.622
46	female	33.44	1	no	southeast	8240.59
37	female	27.74	3	no	northwest	7281.506
37	male	29.83	2	no	northeast	6406.411
60	female	25.84	0	no	northwest	28923.14
25	male	26.22	0	no	northeast	2721.321
62	female	26.29	0	yes	southeast	27808.73
23	male	34.4	0	no	southwest	1826.843
56	female	39.82	0	no	southeast	11090.72
27	male	42.13	0	yes	southeast	39611.76
19	male	24.6	1	no	southwest	1837.237

You want to *predict* **insurance charges** *(target variable)* when given the following set of inputs *(feature variables):*

1. Age
2. Sex
3. BMI
4. Children
5. Smoker
6. Region

(**Note**: All 6 are independent variables)


Gradient Descent
gbhat.com
step: 0: (-8.431, 71.088)
100
80
60
40
20
0
Y
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0
X


2.00
1.75
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Z 1.00
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−0.50
−0.75
−1.00
Y
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
X

Anime Style Transfer

[AnimeGANv2] Landscape photos/videos to anime

How does this work?!

https://huggingface.co/spaces/akhaliq/AnimeGANv2

A simple explanation

1. **Neural Networks**
2. **Adversarial Game?** (Arm wrestle!)
   I want to beat you, you want to beat me, we have conflicting goals.
   Game ends when one player loses.

1. **i. Generator:** Produce “fake” images which closely resemble the original image.
   ii. Discriminator: Classify the Generator’s image as “fake” or “real”
   Game ends when **Generator wins, Discriminator loses**.

If you want to dig in more...

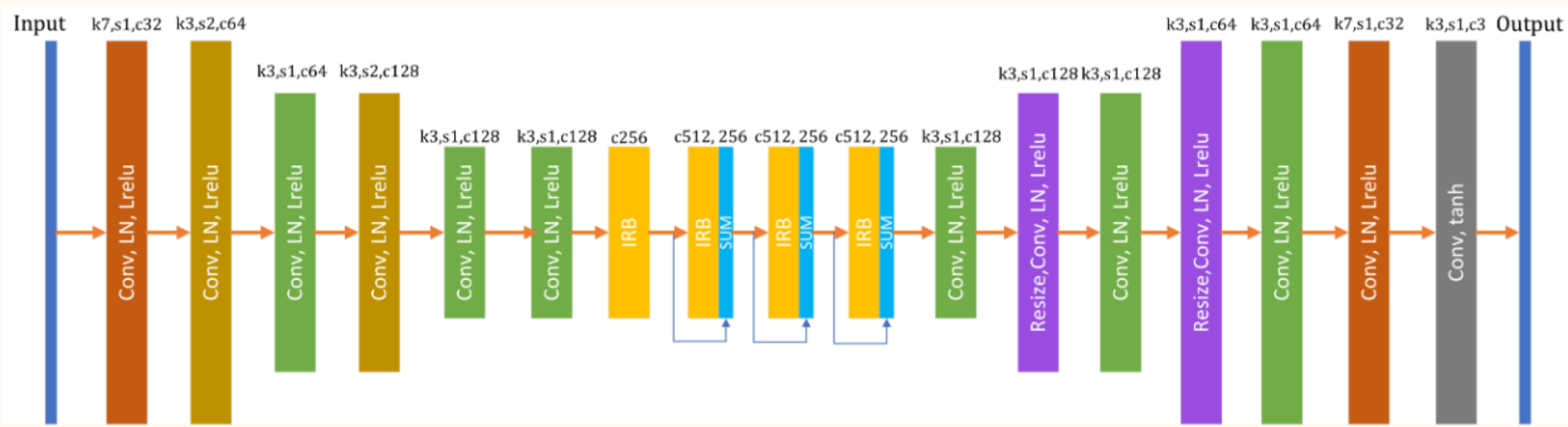

Figure 2. Architecture of the generator network.

Table 1. Information of three anime style datasets.

Anime style	Film	Picture Number	Quality	Download Style Dataset
Miyazaki Hayao	The Wind Rises	1752	1080p	Link
Makoto Shinkai	Your Name & Weathering with you	1445	BD	
Kon Satoshi	Paprika	1284	BDRip	

AnimeGANv2

https://www.bilibili.com/video/BV13T4y1773X/

Feedback

Questions?
Discussion?
Please reach out!

Thank you for attending!