Machine Learning

An Introduction

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What is changing exponentially around us?

- Computing speed
- Data creation

We are living in an exponential and a global world. Something that happens in some other parts of the world affects you minutes later, through stock prices, news, viruses, etc.

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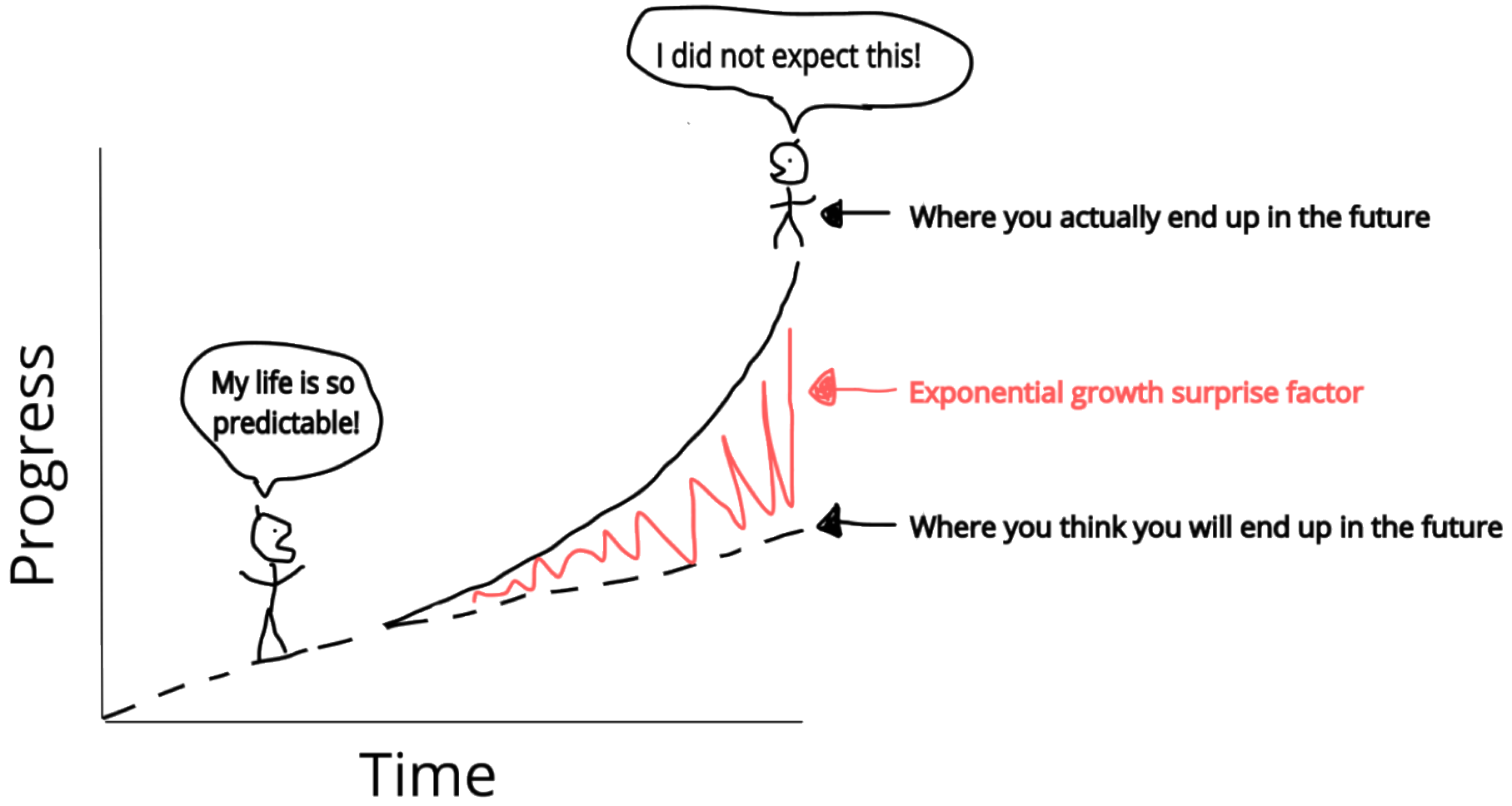
Are we able to understand this growth?



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Two decades back!

ASCI Red

- Commissioned: 1997
- Cost: 55 million USD
- Sponsors: Intel
- Speed: 1.3 Teraflops

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One decade back!

Sony PS 3

- Year: 2006
- Price: 499 USD
- Speed: 2.1 Teraflops

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What is driving this change?

- Data
- Computing
- Development of learning algorithms

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What is machine learning?

- Data mining: Helps is discovering new knowledge from large data bases
- Machine learning: Create systems with the help of data that can solve specialized problems like a human or even better than a human
- Artificial intelligence: Any artificial system that is non-living but shows some form of intelligence

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Methods and Applications

- Support vector machines, decision trees

Loan acceptance dataset

Predict

1	Marital Status	Kids	Annual Household Salary	Loan Amount	Car owner	Education Level	Loan Granted
2	0	0	106020	185913	1	0	0
3	0	2	1270279	4907598	1	0	0
4	1	3	1086365	3012855	1	0	1
5	1	2	516564	2493950	1	0	0
6	0	2	1291768	4870552	1	5	1
7	0	1	813425	1815248	0	0	0
8	1	0	940121	2039002	1	5	1
9	1	0	1211396	1373174	1	4	1
10	0	1	1508588	5926431	1	4	1
11	1	2	4458464	24451446	0	5	1
12	0	2	607875	1844438	0	0	0
13	0	0	477131	1372348	1	4	1
14	1	2	339217	918574	1	1	1
15	1	0	1183169	4281420	0	1	1
16	0	2	1455947	6360417	1	0	0
17	1	1	358692	1269449	1	0	1

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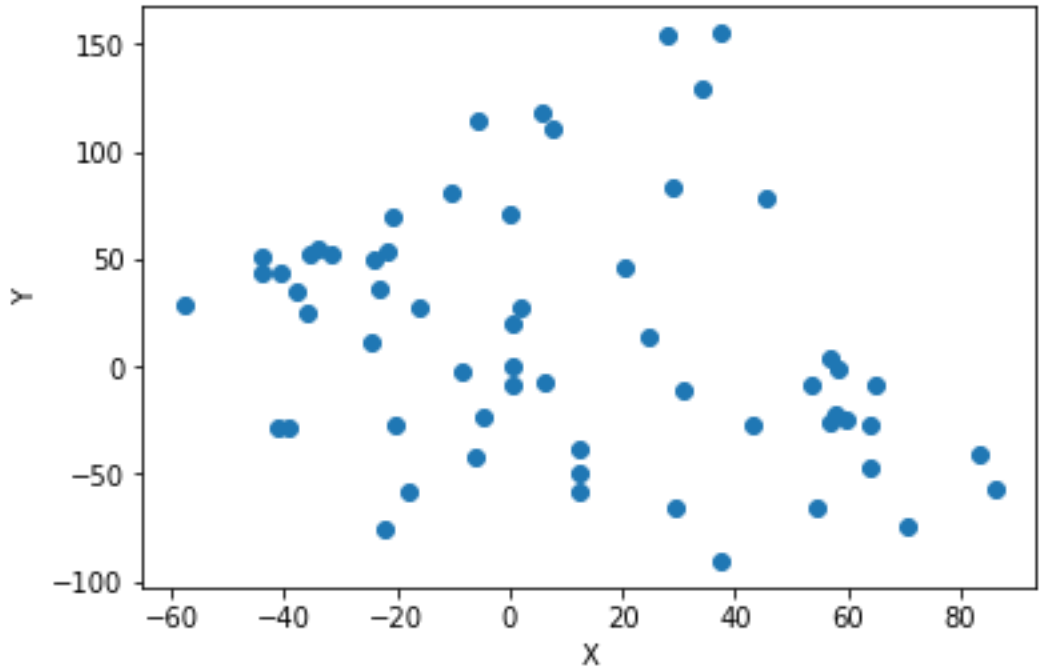
Methods and Applications

- Clustering, optimization



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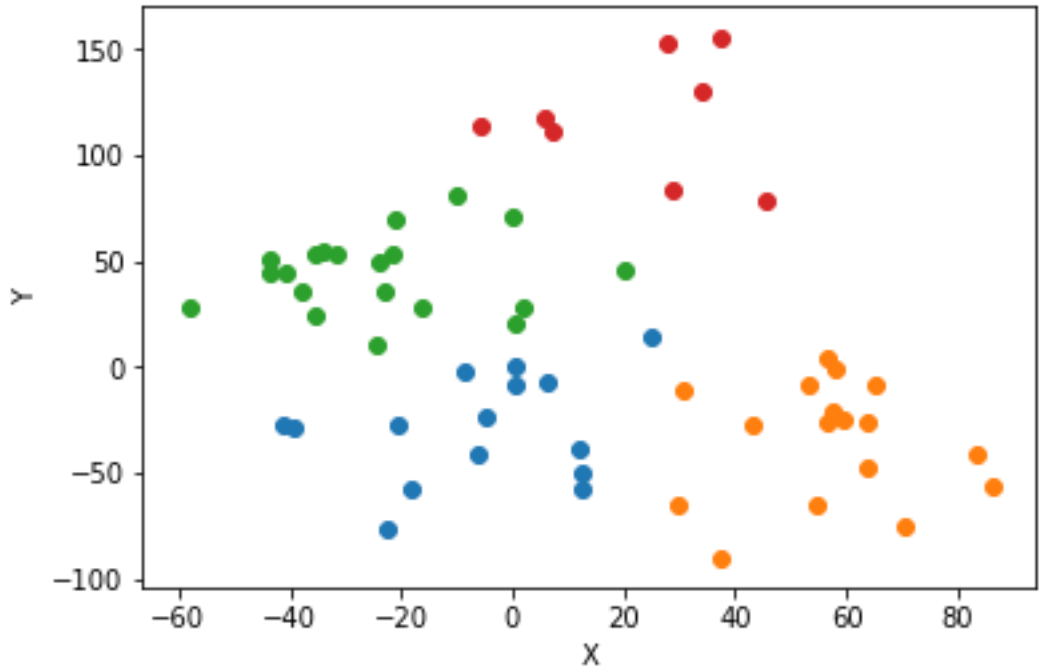
Methods and Applications

- Clustering, optimization



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Methods and Applications

- Neural Networks

Handwriting recognition

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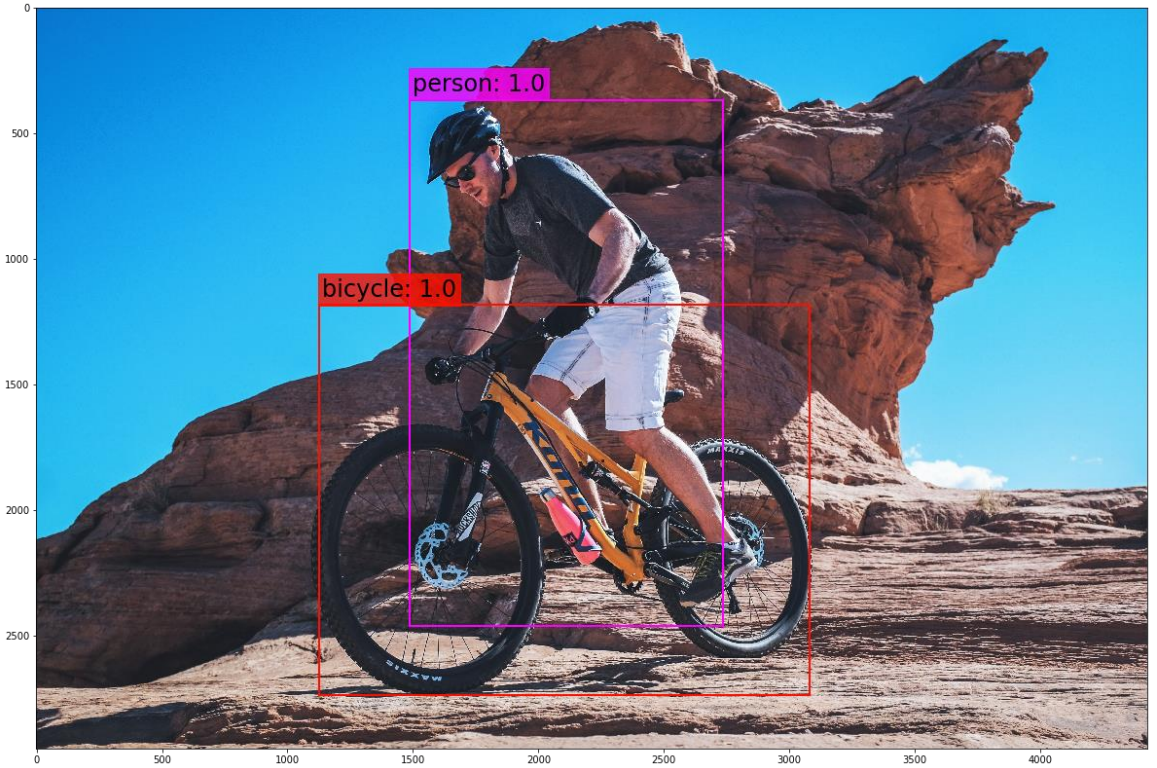
Methods and Applications

- Deep learning



Object detection

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Methods and Applications

- Natural language processing

S No.	Title	Decisions
1	SpiceJet to issue 6.4 crore warrants to promoters	{'SpiceJet': 'hold'}
2	Mid-cap funds can deliver more, stay put: Experts	{'Mid-cap funds': 'buy'}
3	Mid caps now turn into market darlings	{'Mid caps': 'buy'}
4	Market seeing patience, if not conviction: Prakash Diwan	{'Market': 'hold'}
5	Infosys: Will the strong volume growth sustain?	{'Infosys': 'hold'}
6	Hudco raises Rs 279 cr via tax-free bonds	{'Hudco': 'buy'}
7	HOEC could retest 30-35 levels: Ashwani Gujral	{'HOEC': 'hold'}
8	Gold shines on seasonal demand; Silver dull	{'Gold': 'buy', 'Silver': 'sell'}
9	Genpact appoints Edward J Fitzpatrick as CFO	{'Genpact': 'hold'}
10	EXL beats profit estimates, cuts sales outlook	{'EXL': 'buy'}
11	Wait and watch on Bharti Airtel: Vinay Khattar	{'Bharti Airtel': 'hold'}
12	Would stick to banking: Girish Pai, Centrum Broking	{'banking': 'buy', 'Centrum Broking': 'hold'}
13	MSCI adds Aurobindo Pharma to India index	{'Aurobindo Pharma': 'buy', 'MSCI': 'hold', 'India index': 'hold'}
14	Ashok Leyland raises Rs 667 crore through QIP	{'Ashok Leyland': 'buy'}
15	At Wipro, growth remains a mirage	{'Wipro': 'sell'}

Financial News Analysis

Buy, Sell or Hold stocks based on news

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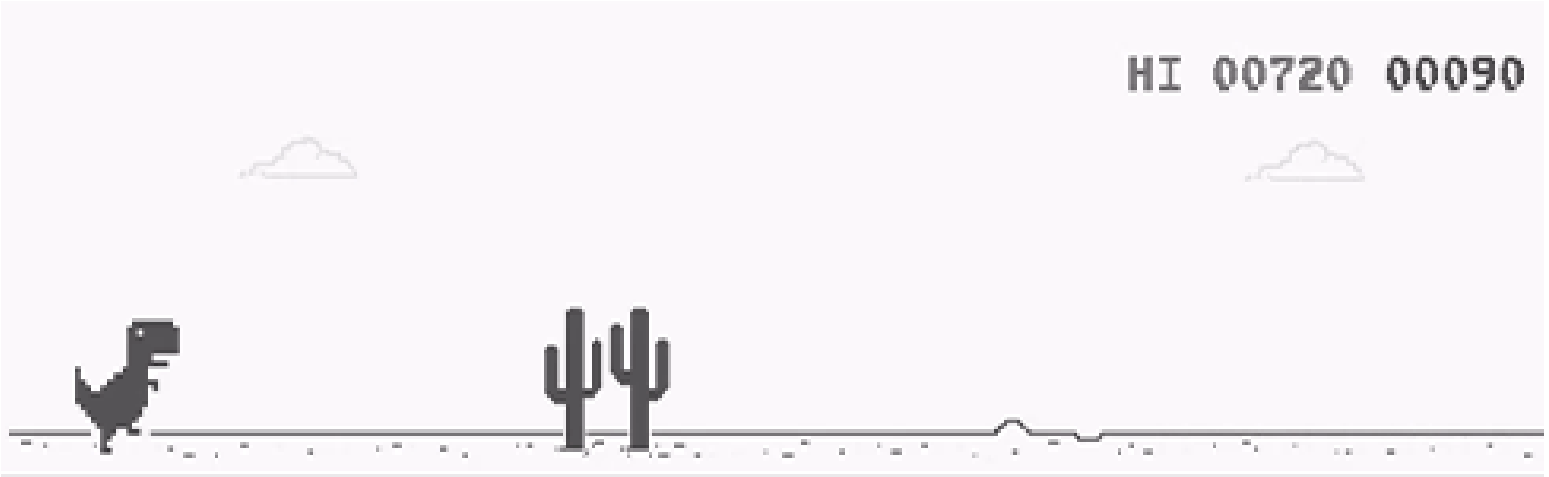
Methods and Applications

- Computer vision



Make T-Rex, the dinosaur jump with gestures

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Supervised vs Unsupervised Learning

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Supervised Learning

Learns based on instruction

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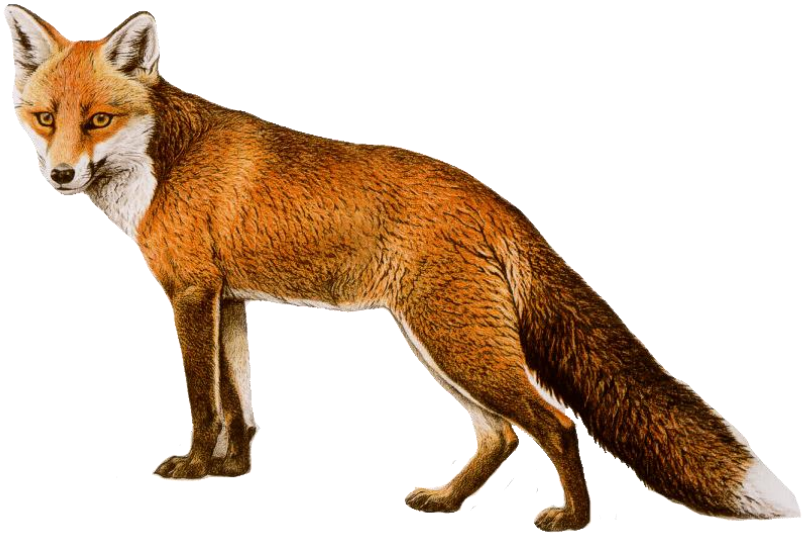
Supervised learning: What about a fox?



The child will call it a dog.

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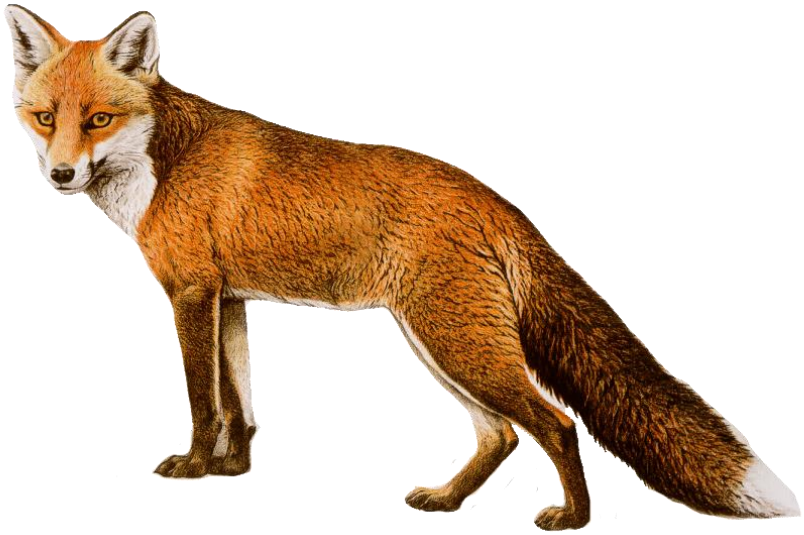
Supervised learning: Model update!



The child will call it a dog.

New data requires model update.

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Unsupervised Learning

Learns based on size and shape of the face.

Learns based on similarity

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Learns based on similarity

Small dog with flat face.

Mogli thinks that it is a cat!

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Unsupervised Learning: Model update!

Small dog with flat face.

Mogli thinks that it is a cat!

Over time adds one more dimension to its model → Sound

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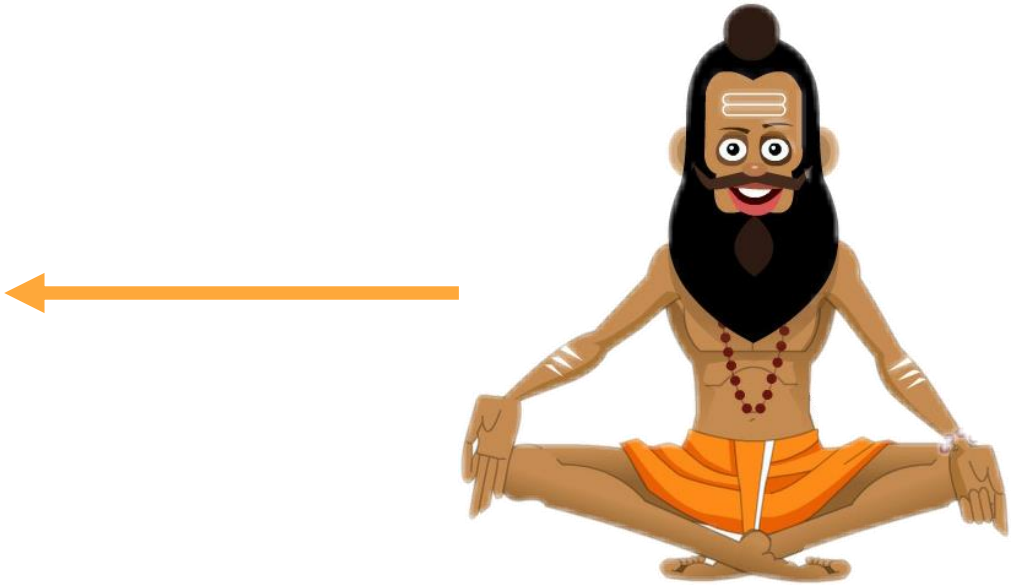
Transfer Learning

A sadhu living in Indian forests recognizes monkeys and wolves



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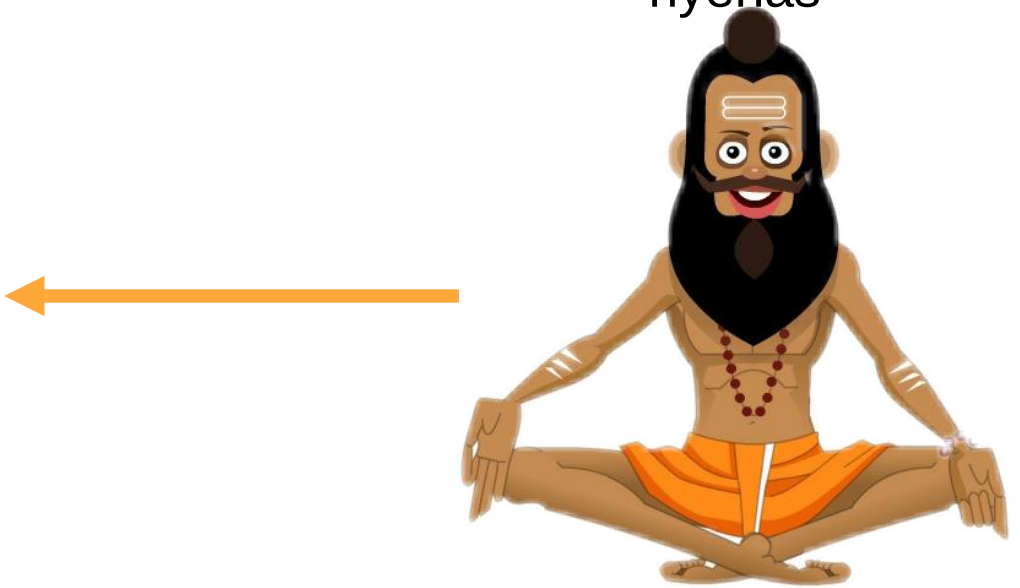
Transfer Learning

The sadhu goes on a trip to African forests where he sees baboons and hyenas



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