

AI for Good Workshop

March 2019

Session 1

Artificial Intelligence for everyone

Be a leader in
applying Deep Learning

<https://sites.google.com/view/AlforEveryone>

Workshop goals

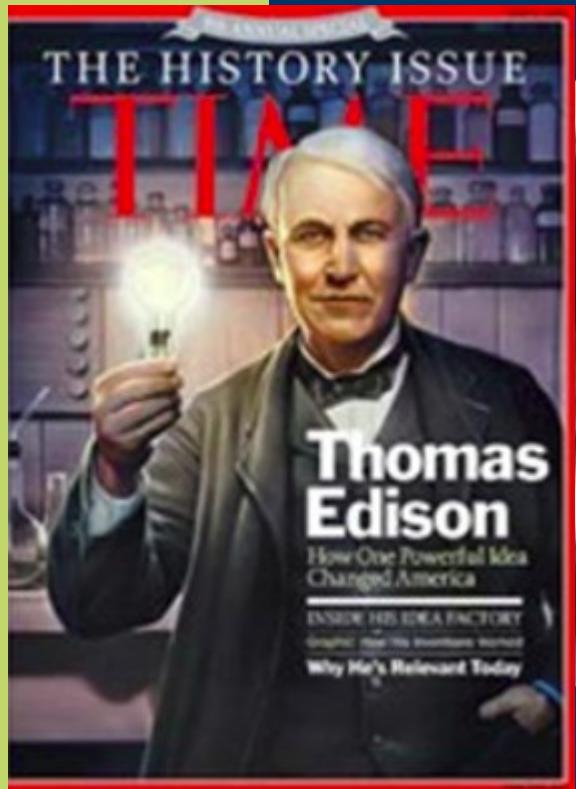
- Day 1: Deep Learning made friendly
 - Special: Activity to learn concepts like SDG & GAN
- Day 2: AI for Social Good
 - Special: Brings out the hidden potential in you !

Goal

1. What is the future of AI?
2. How can you apply AI?
3. How can you invent AI?

You will be a leader in Deep Learning

'AI IS THE NEW ELECTRICITY'



"Just as electricity transformed almost everything 100 years ago, today I actually have a hard time thinking of an industry that I don't think AI will transform in the next several years."

Andrew Ng

Former chief scientist at Baidu, Co-founder at Coursera

Day 2 of this workshop: AI for Good





SUSTAINABLE DEVELOPMENT GOALS



1 NO POVERTY



2 ZERO HUNGER



3 GOOD HEALTH AND WELL-BEING



4 QUALITY EDUCATION



5 GENDER EQUALITY



6 CLEAN WATER AND SANITATION



7 AFFORDABLE AND CLEAN ENERGY



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



14 LIFE BELOW WATER



15 LIFE ON LAND



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



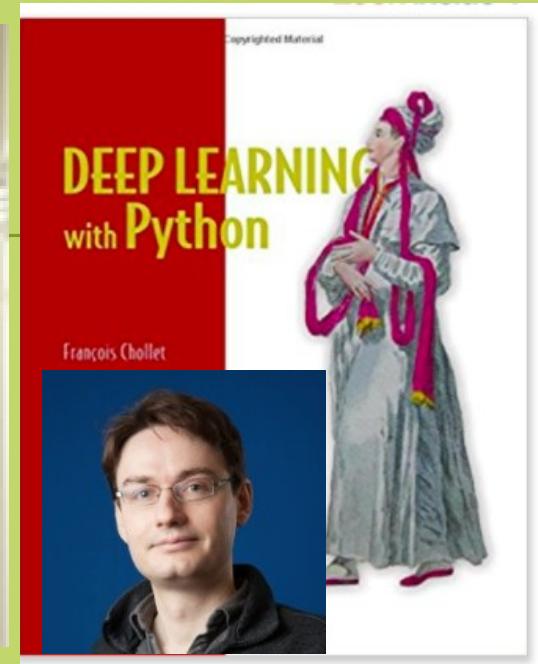
**SUSTAINABLE
DEVELOPMENT
GOALS**

Our inspiration

Friendly approaches :

1) KERAS.io

François Chollet's
Book on "Deep Learning with Python"



2) Deeplearning.ai (Coursera.org)

Andrew Ng

3) Fast.ai

Jeremy



More inspiration

Excellent Resources

- **Stanford cs231 n**

<http://cs231n.stanford.edu>

- **MIT Deep Learning**

<http://introtodeeplearning.com/>

<https://deeplearning.mit.edu>

- **IIT Madras**

my classes notes with Prof. Anurag (**Deep Learning**)

Why you will be a leader?



Your opportunity
to be a leader

**“Though AI research is moving forward amazingly fast,
most of the research is NOT yet applied”**



François Chollet @fchollet · Feb 11

As of Feb 2019, I think we are still not near peak Deep Learning.

Peak hype? That was around 2016-2017.

Peak applications & deployment? We have a long way to go. W

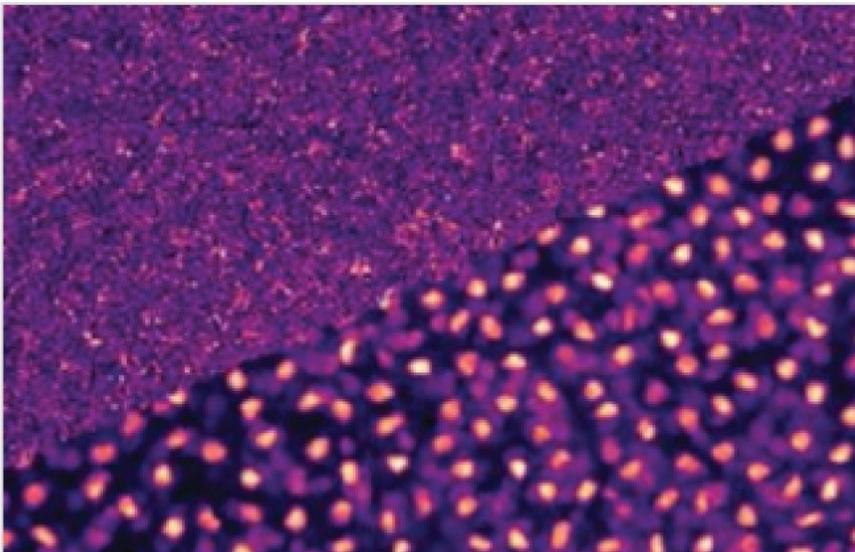
Pre-requisites = mathematics / None

- **Don't worry!**
 - This workshop is for you !!
- **Do you need to have a PhD in Mathematics to learn AI?**
 - **Pre-requisites: None**

Are you from non-CS branch?



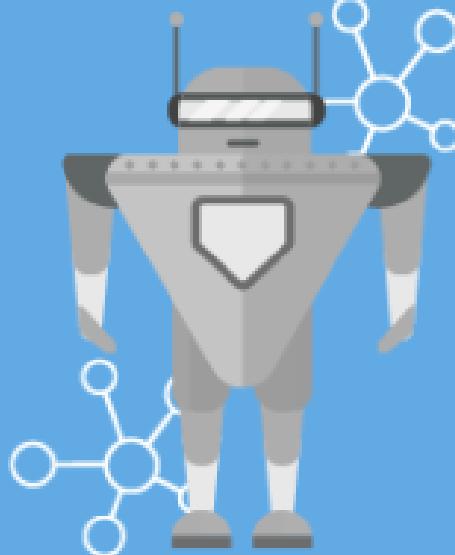
Method to watch



What are coolest jobs for the next 3 years

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



1950's

1960's

1970's

1980's

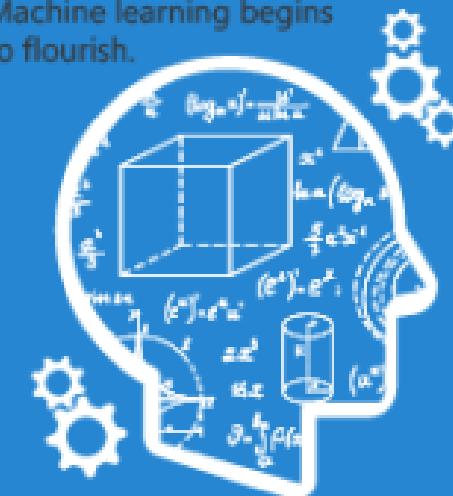
1990's

2000's

2010's

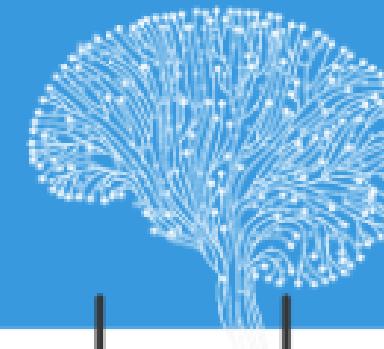
MACHINE LEARNING

Machine learning begins to flourish.

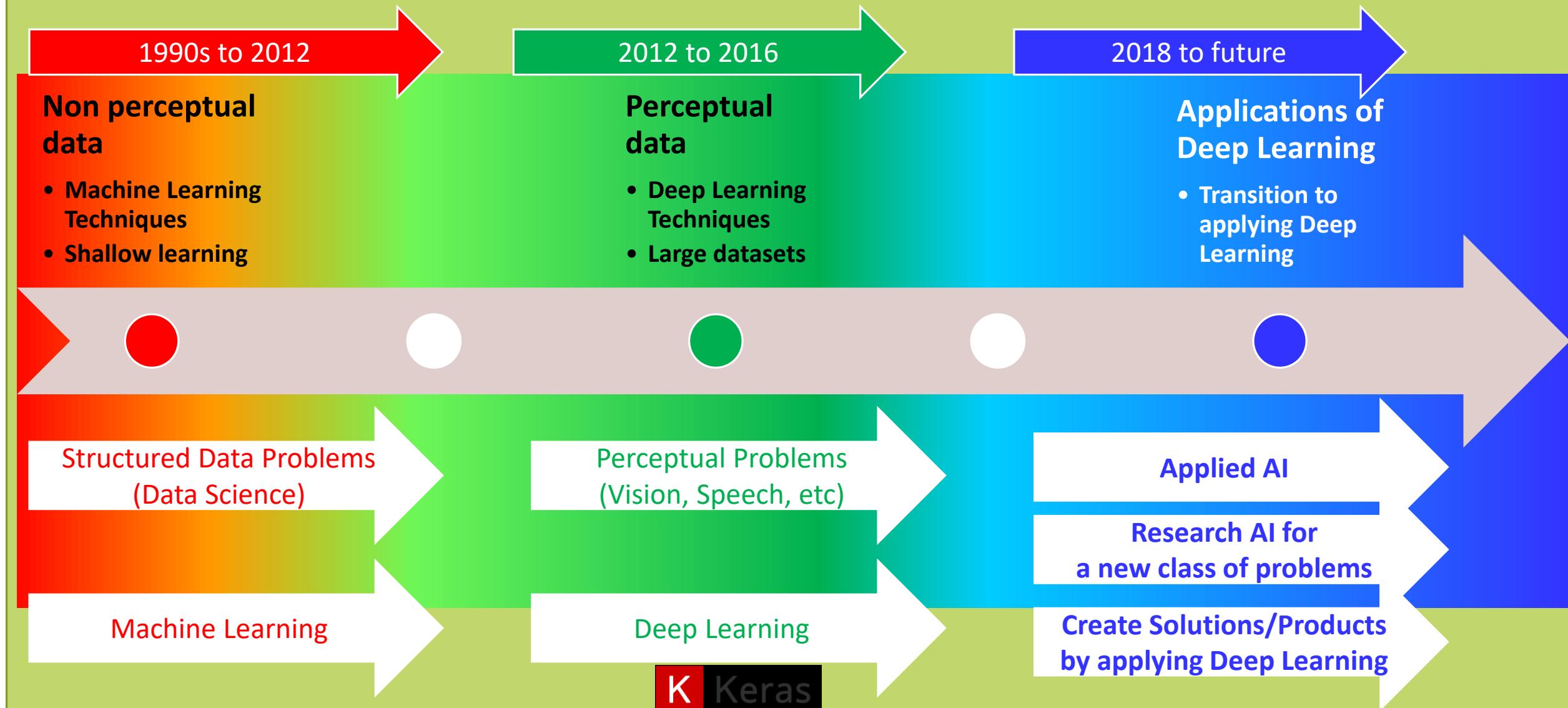


DEEP LEARNING

Deep learning breakthroughs drive AI boom.



History of AI



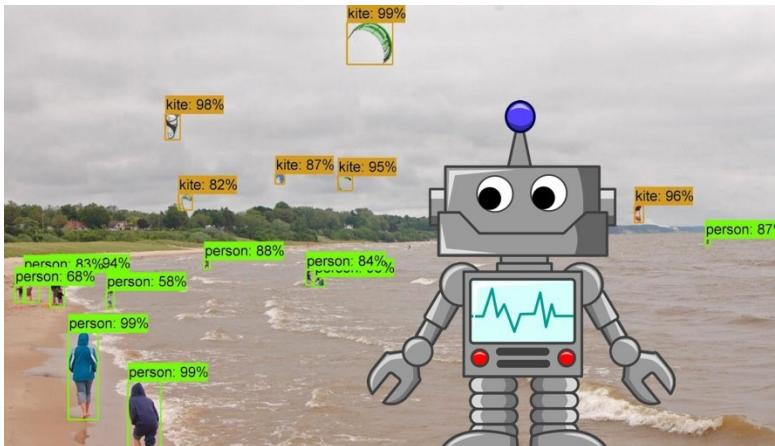
The future of AI

1. Deep Learning



“Biggest leap since invention of computers”

Output of AI: Scalar values (numbers)

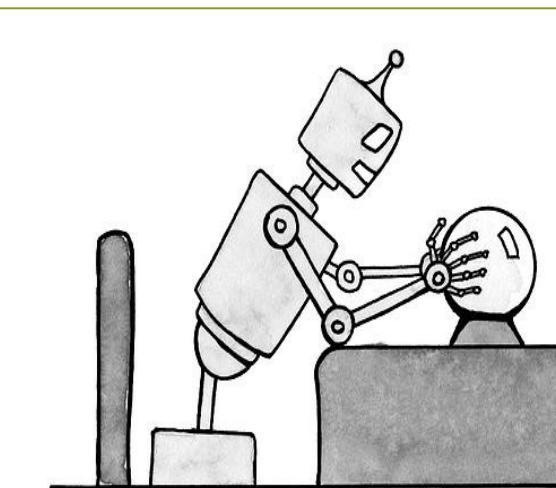


2. Generative Deep Learning



GAN “the most interesting idea in the last 10 years in ML.”

Output of AI: Vectors , Images

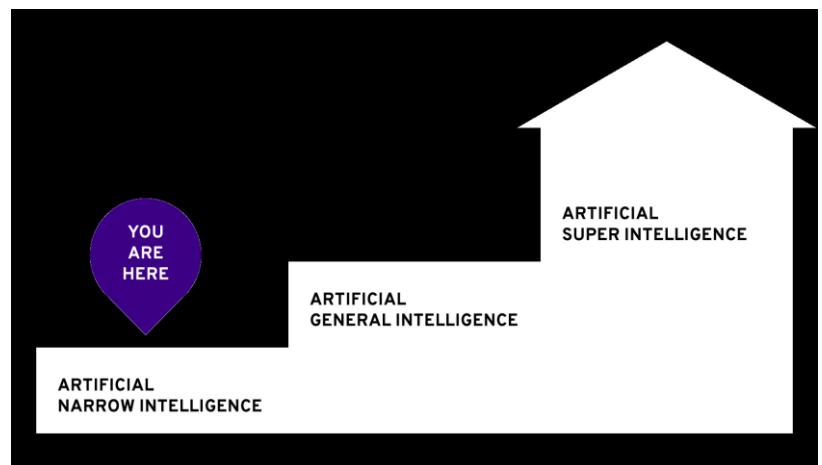


3. AI that creates another AI



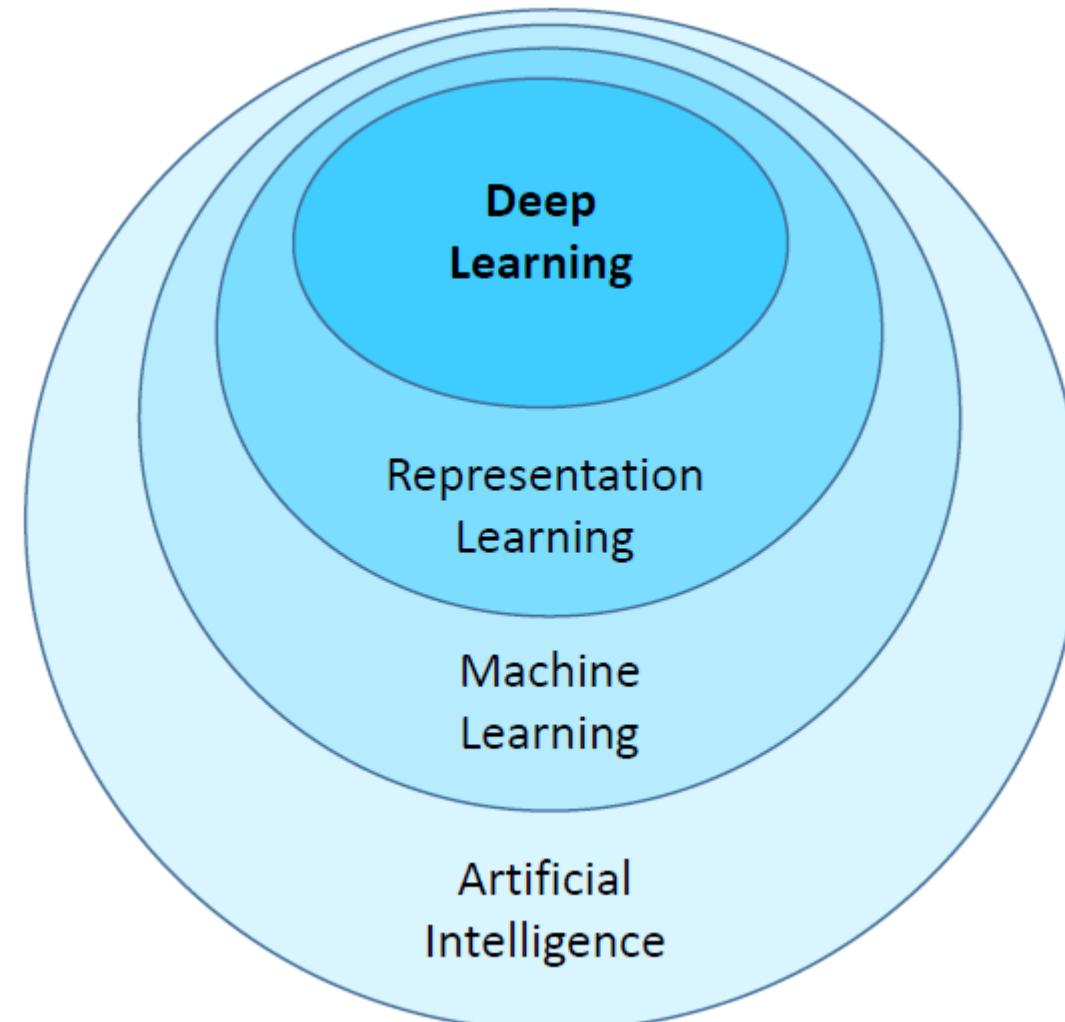
Architecture Search/ Progressive

Output of AI: Neural networks



AI == Deep Learning ?

- **Artificial Intelligence in last 5 years = Deep Learning**



The future of AI

1. Deep Learning



“Biggest leap since invention of computers”



Output of AI: Scalar values (numbers)

Output = 2

2. Generative Deep Learning



GAN “the most interesting idea in the last 10 years in ML.”



Output of AI: Vectors , Images

Output =



3. AI that creates another AI



Neural network auto-evolution



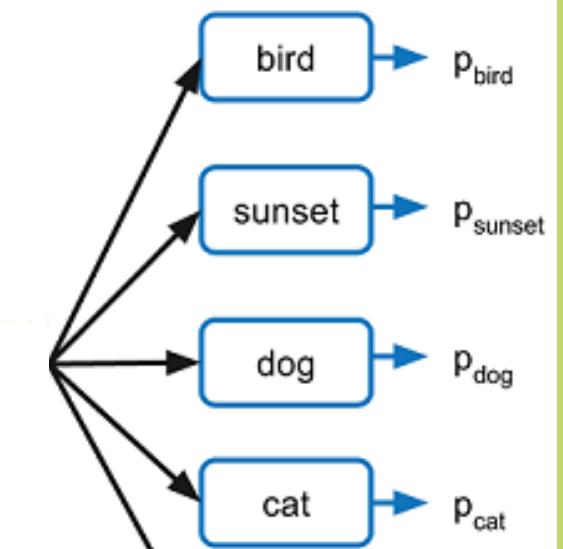
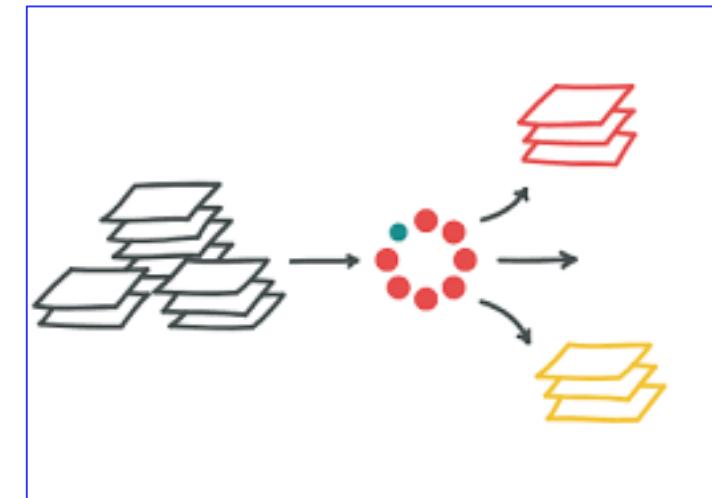
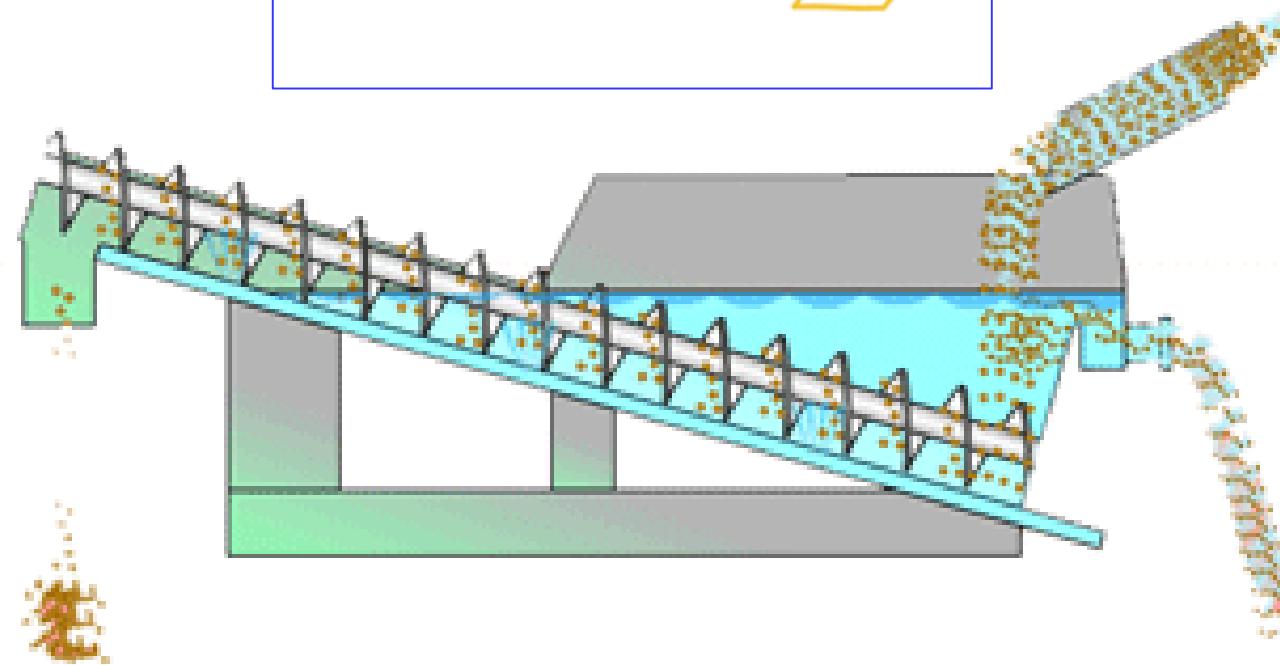
Output of AI: Neural networks

Output =



1. Deep Learning

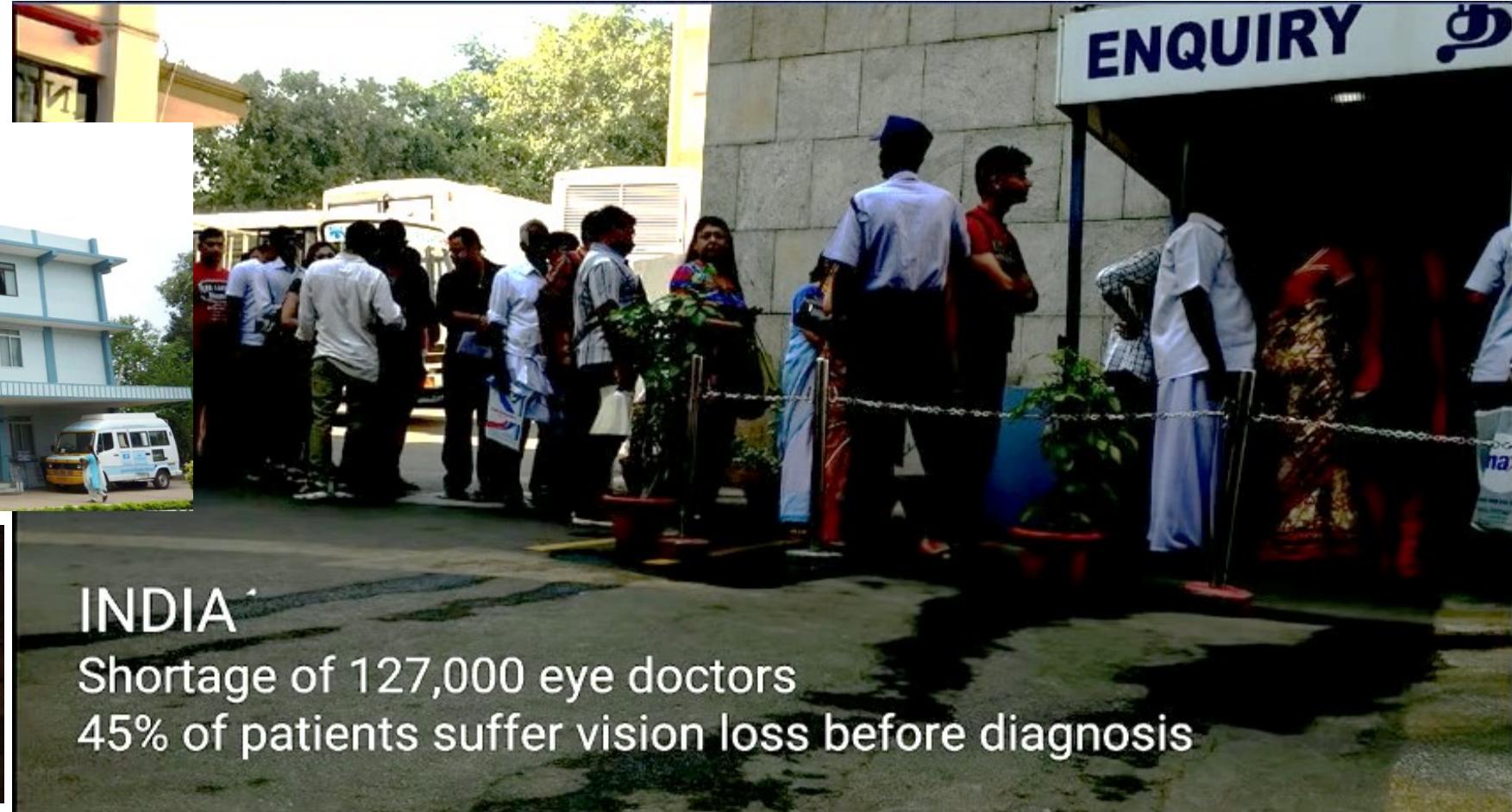
visual recognition – image classification



1. Deep Learning visual recognition – image classification



Google works with Aravind Eye Hospital to deploy AI that can detect eye disease



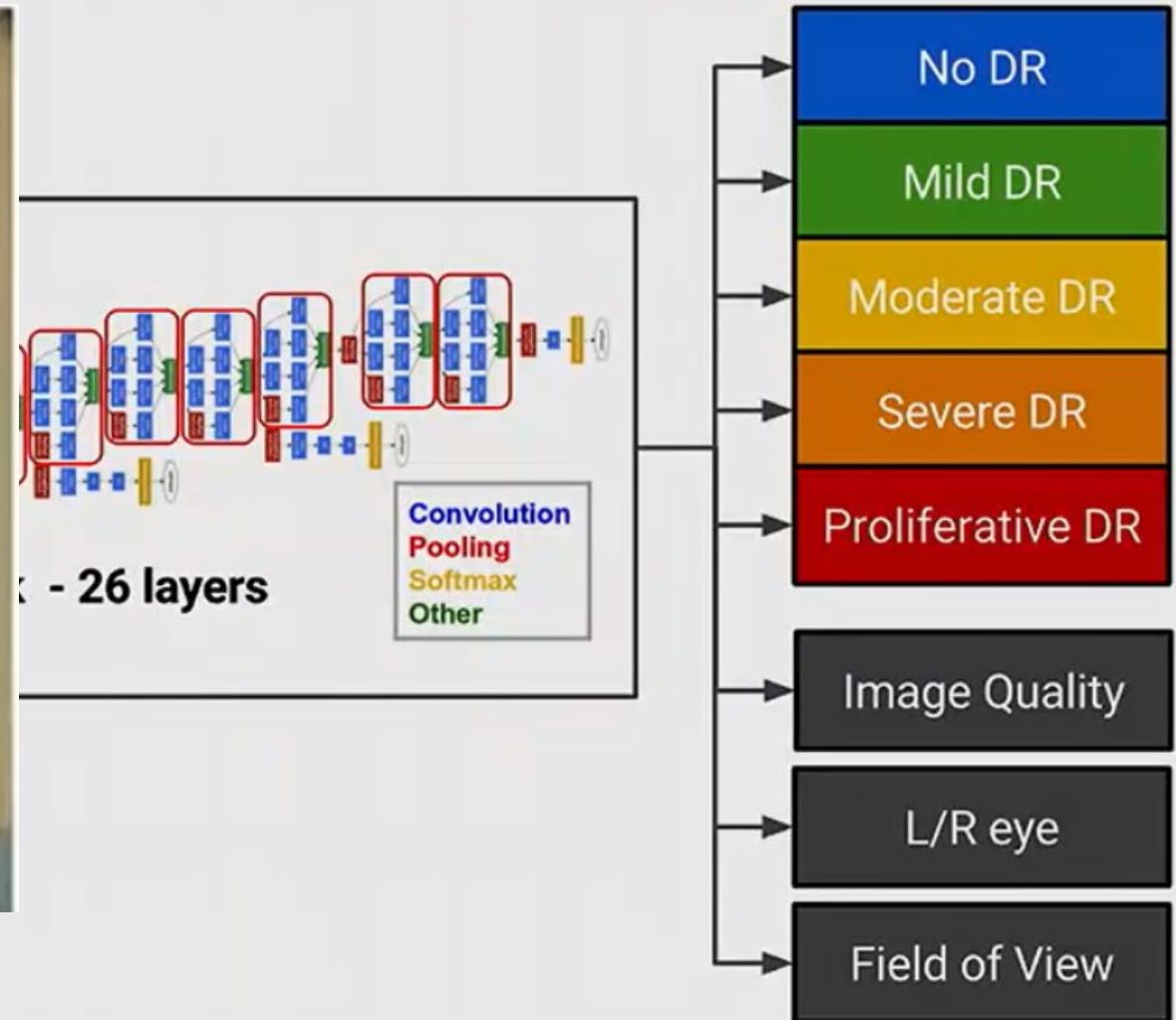
INDIA

Shortage of 127,000 eye doctors
45% of patients suffer vision loss before diagnosis

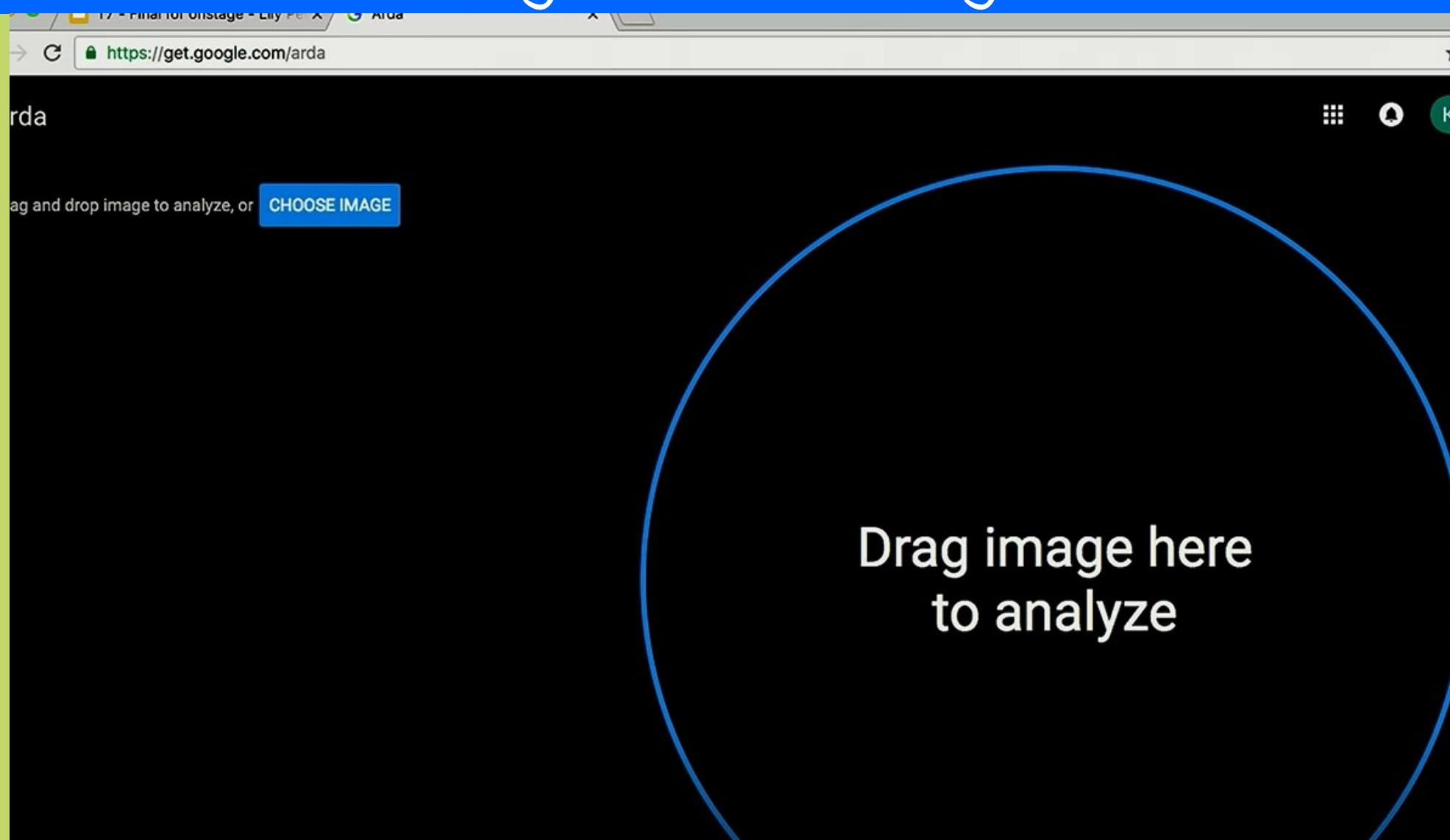
1. Deep Learning

visual recognition – image classification

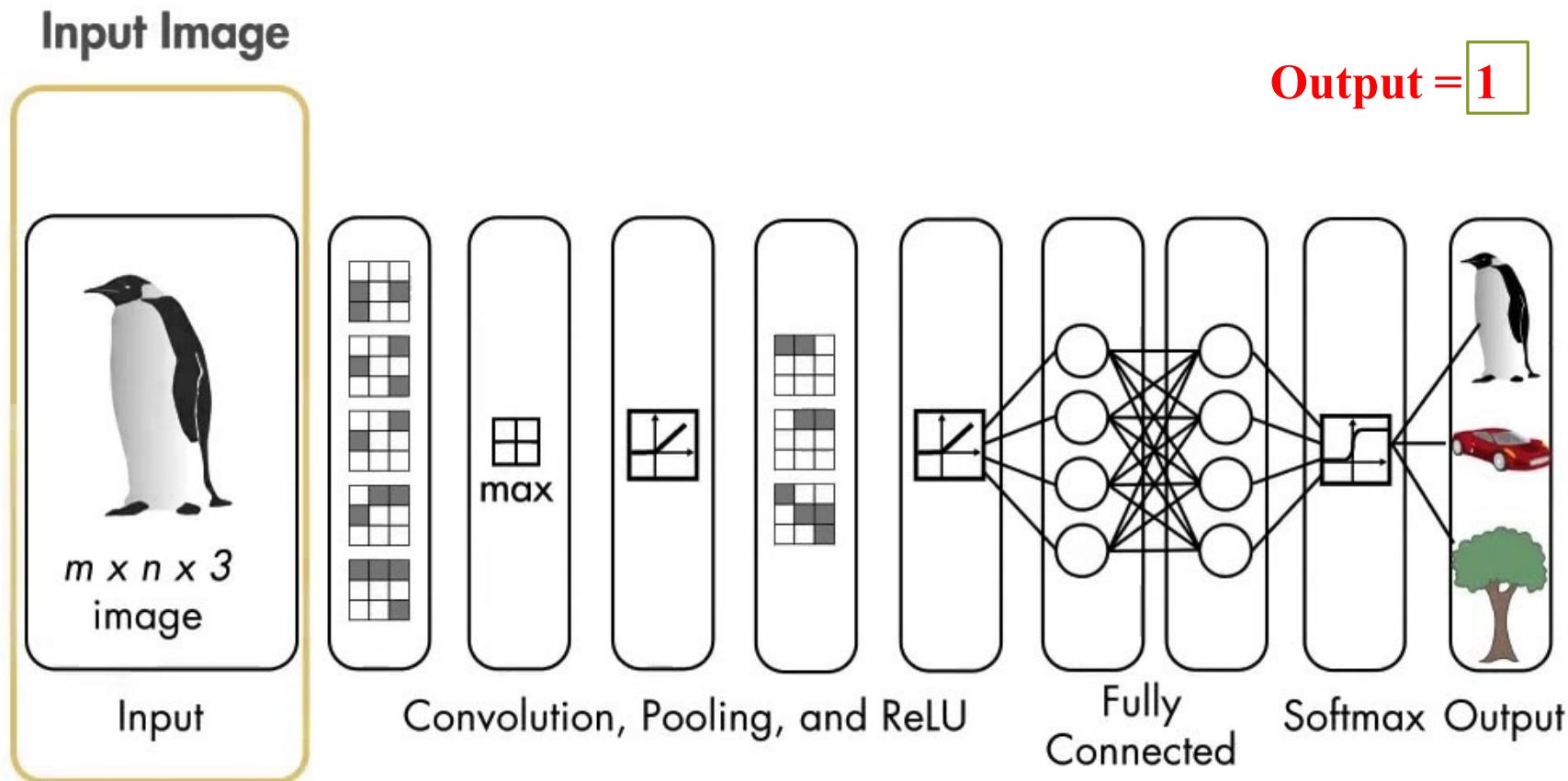
Adapt deep neural network to read fundus images



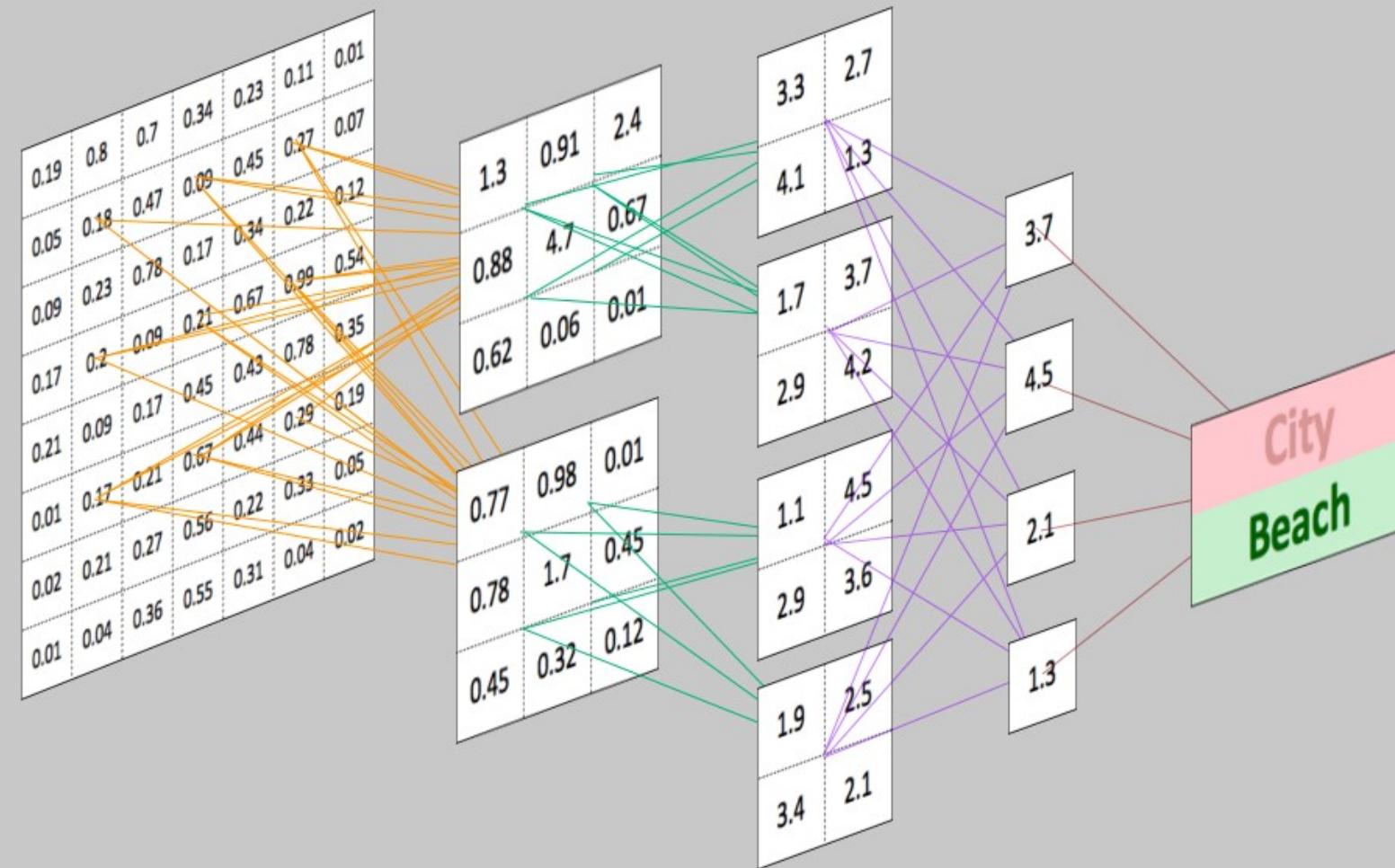
1. Deep Learning visual recognition – image classification



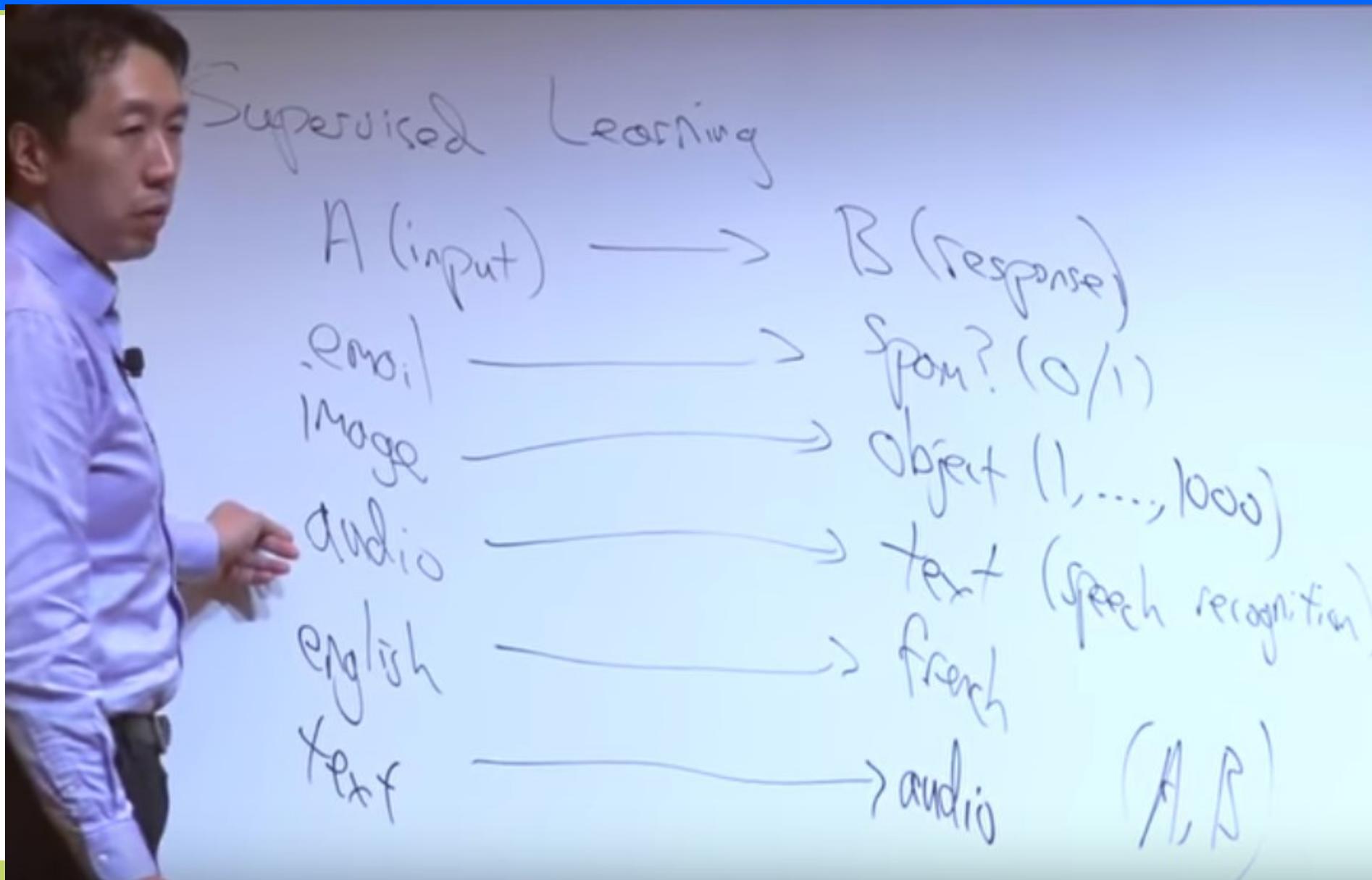
1. Deep Learning architecture



1. Deep Learning architecture



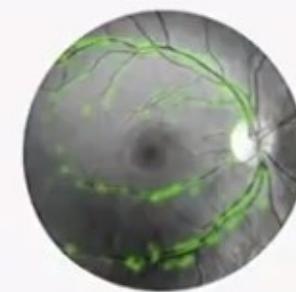
A → B



1. Deep Learning

Predicting the future

Predicting cardiovascular risk



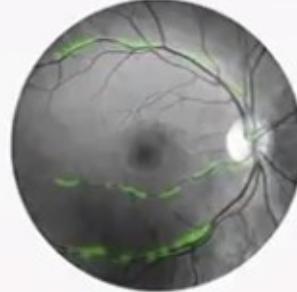
Age

Predicted: 59.1 years
Actual: 57.6 years



Biological sex

Predicted: Female
Actual: Female



Smoking

Predicted: Non-smoker
Actual: Non-smoker



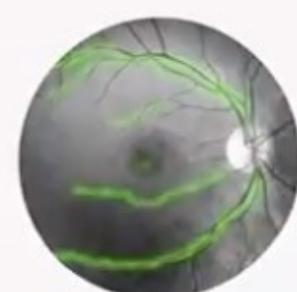
A1C

Predicted: Non-diabetic
Actual: Non-diabetic



BMI

Predicted: 24.1 kg/m²
Actual: 26.3 kg/m²

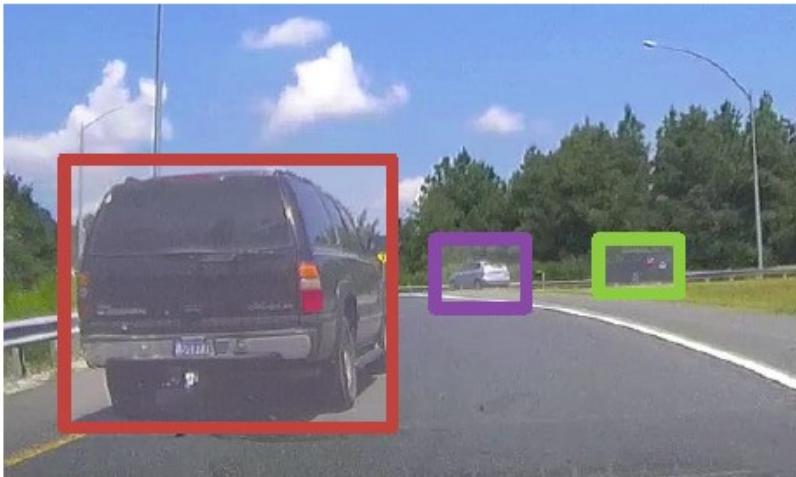


Systolic blood pressure

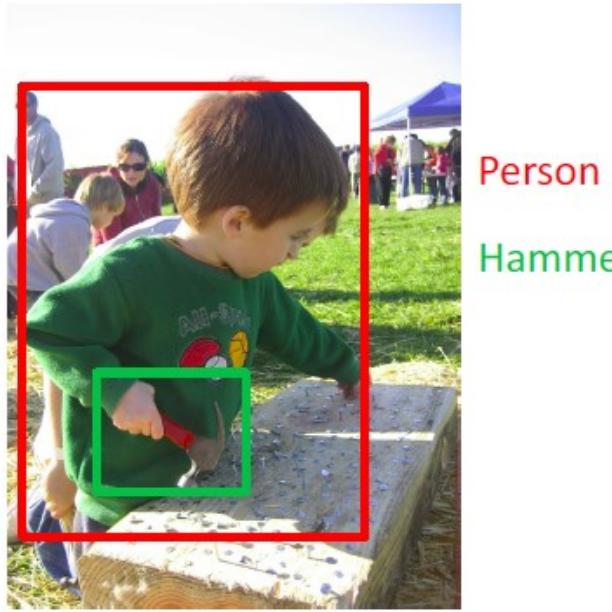
Predicted: 148.0 mmHg
Actual: 148.5 mmHg

Source: Google

1. Deep Learning visual recognition tasks

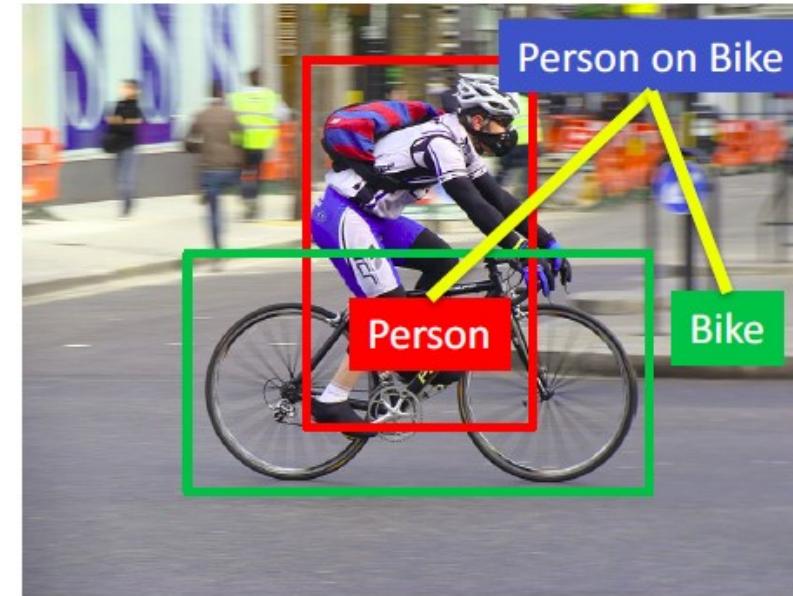


[This image](#) is licensed under CC BY-NC-SA 2.0; changes made



Person

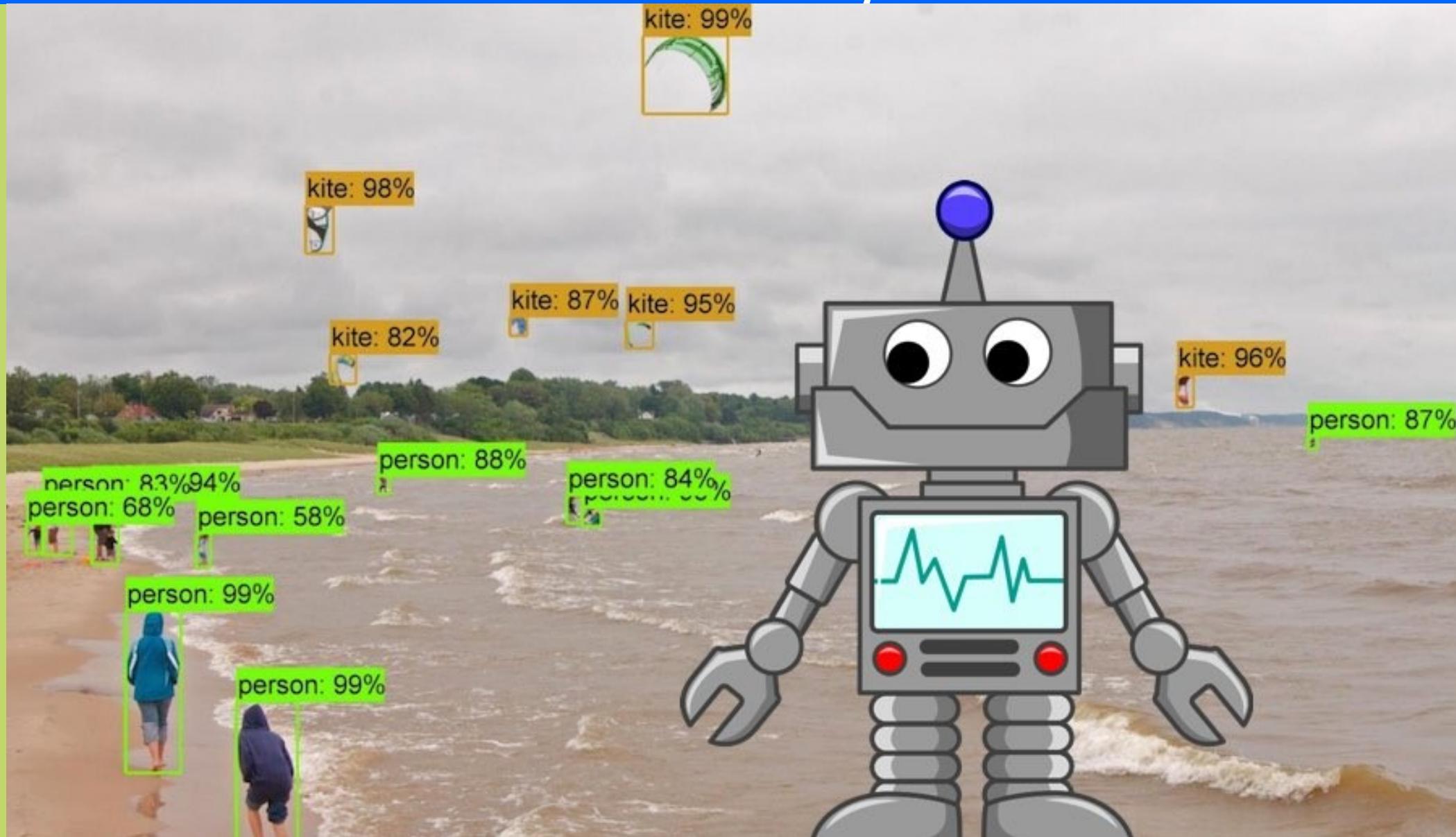
Hammer



[This image](#) is licensed under CC BY-SA 3.0; changes made

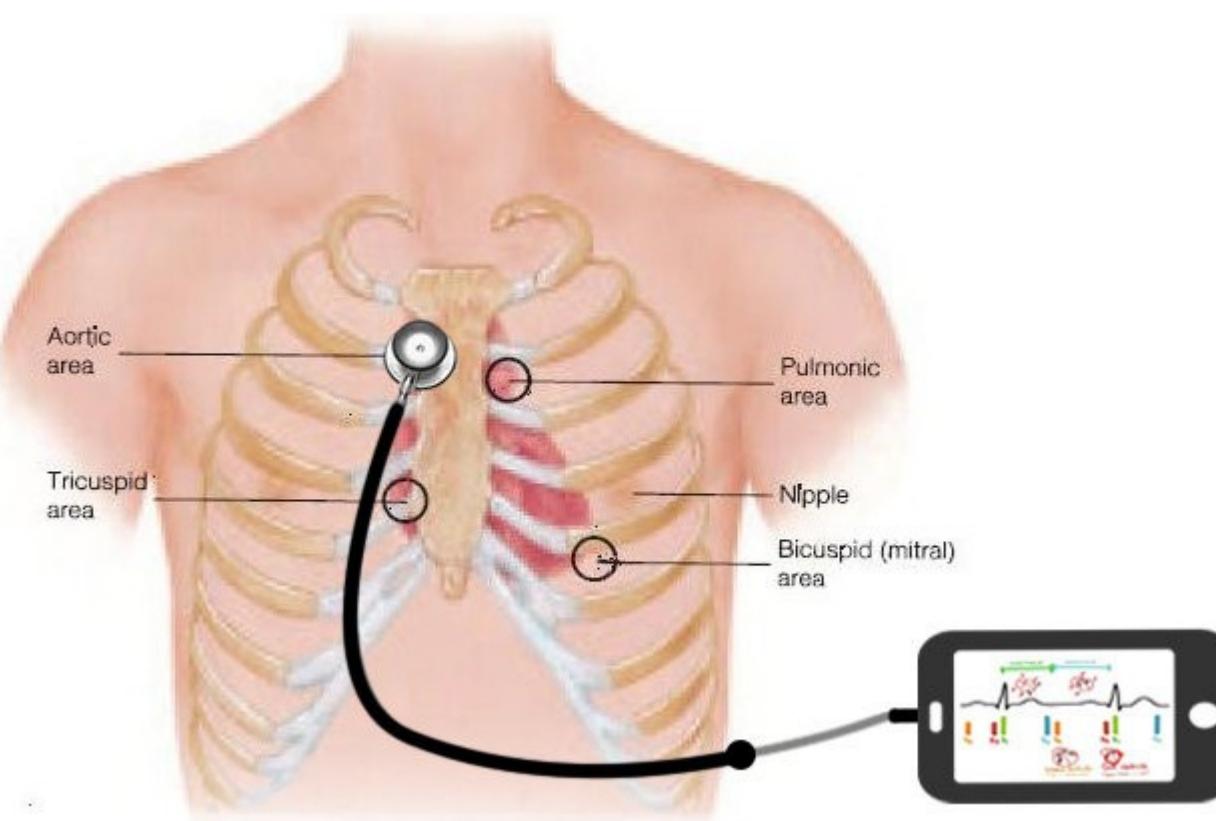
- Object detection
- Action classification
- Image captioning
- ...

1. Deep Learning visual recognition



1. Deep Learning sound pattern recognition

Monitor your heart 24/7 and preventive health alerts



5 microphones listen to heart values



Deep Learning in One Slide

- **What is it:**
Extract useful patterns from data.
 - **How:**
Neural network + optimization
 - **How (Practical):**
Python + TensorFlow & friends
 - **Hard Part:**
Good Questions + Good Data
 - **Why now:**
Data, hardware, community, tools, investment
 - **Where do we stand?**
Most big questions of intelligence have not been answered nor properly formulated
- Exciting progress:**
- Face recognition
 - Image classification
 - Speech recognition
 - Text-to-speech generation
 - Handwriting transcription
 - Machine translation
 - Medical diagnosis
 - Cars: drivable area, lane keeping
 - Digital assistants
 - Ads, search, social recommendations
 - Game playing with deep RL

Credits:



For the full list of references visit:
<https://hcai.mit.edu/references>

<https://deeplearning.mit.edu> 2019

everyone

The future of AI

1. Deep Learning



“Biggest leap since invention of computers”



Output of AI: Scalar values (numbers)

Output =

2. Generative Deep Learning



GAN “the most interesting idea in the last 10 years in ML.”



Output of AI: Vectors , Images

Output =



3. AI that creates another AI



Progressive, AutoML



Output of AI: Neural networks

Output =



2. Generative Deep Learning

Generate a image

- Output: image



François Chollet · @fchollet · Feb 10

I made 4 pics in the past 6 months, and they all follow the same thread

2. Generative Deep Learning

Convert Text to image

- Generative Deep Learning
 - VAE
 - GAN

Examples of generated images

[Reed +, ICML 2016]

A tiny bird, with a tiny beak, tarsus and feet, a blue crown, blue coverts, and black cheek patch

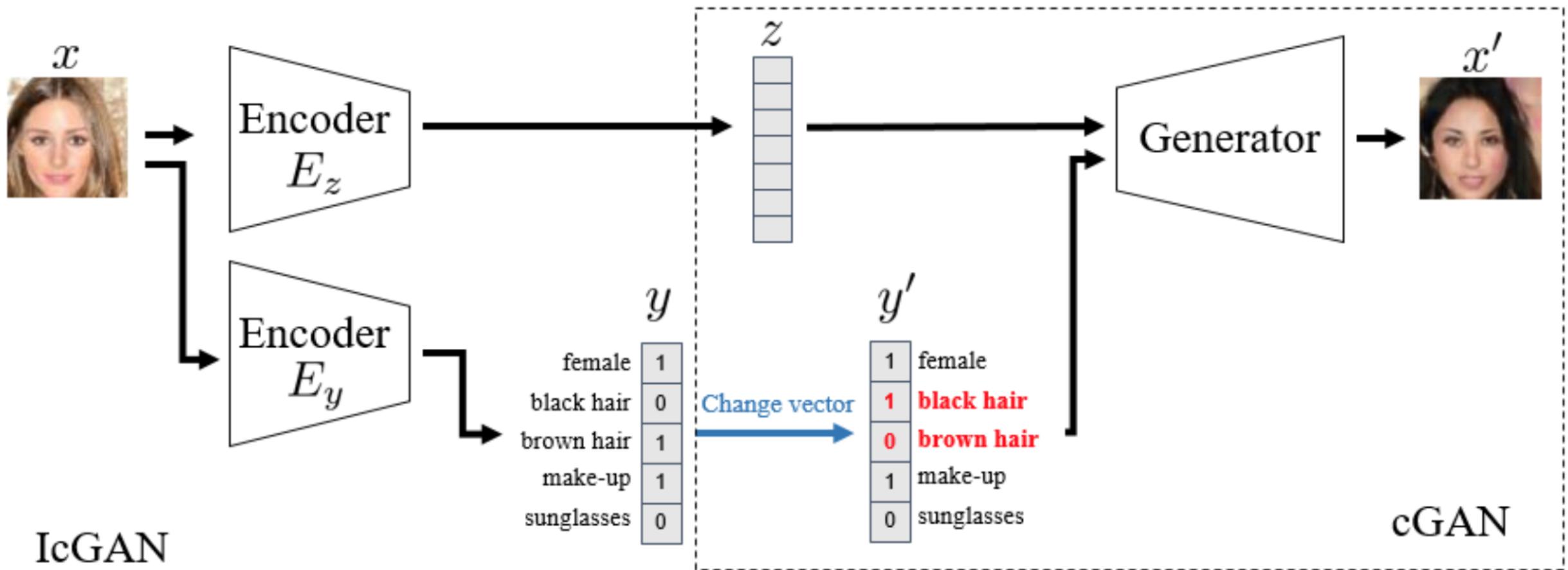


Bright droopy yellow petals with burgundy streaks, and a yellow stigma



2. Generative Deep Learning

Create a artificial face



The future of AI

1. Deep Learning



“Biggest leap since invention of computers”



Output of AI: Scalar values (numbers)

Output =

2. Generative Deep Learning



GAN “the most interesting idea in the last 10 years in ML.”



Output of AI: Vectors , Images

Output =



3. AI that creates another AI



Progressive, AutoML



Output of AI: Neural networks

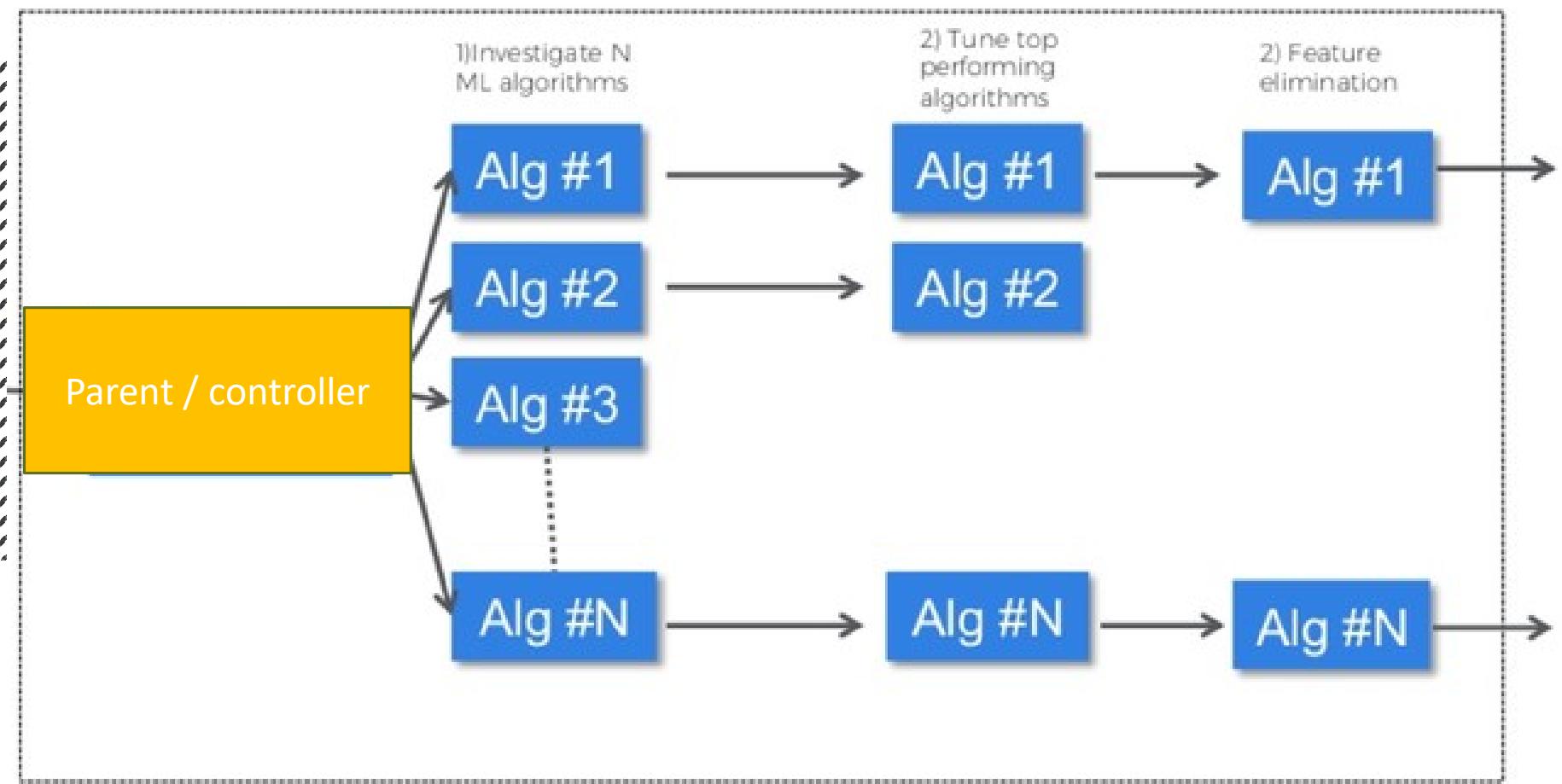
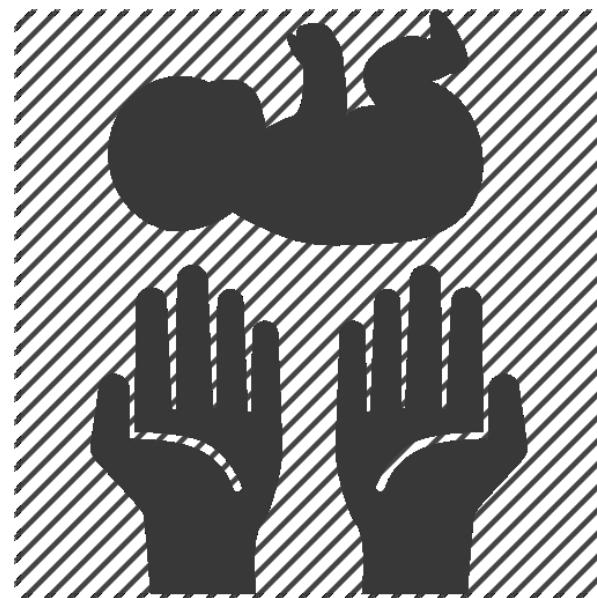
Output =



3. Artificial General Intelligence

A neural network creates another one

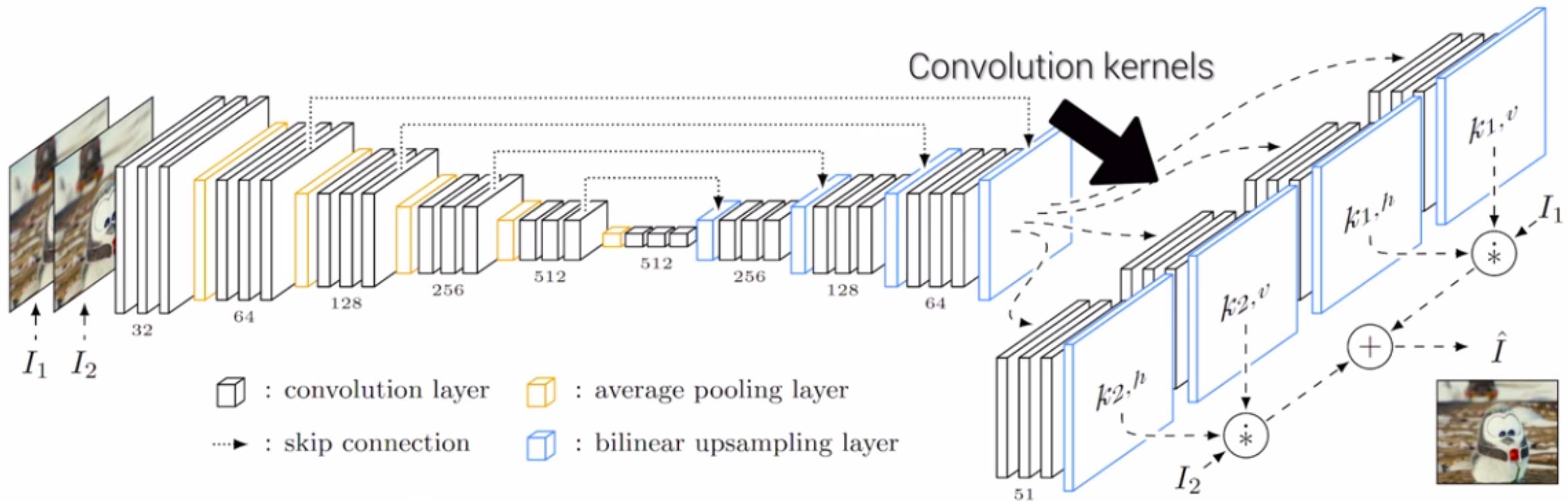
AutoML



3. Artificial General Intelligence

A neural network creates another one!

- Output: neural network



Goal

- What is the future of AI?
- How can you apply AI?
- How can you invent AI?

You will be a leader in Deep Learning

Is this a right time ?

- Is this a right time to unlock the potential of AI ?

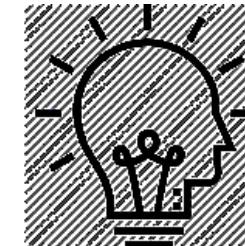
Unlock the potential of modern travel



Commercial jet flights – Pay per trip



Unlock the potential of AI



Cloud/ Serverless - Pay per Seconds



Jet Engine



Deep Learning algorithms



Oil



Data



How you can lead?

How you lead the transition?

Create your custom AI model using your data

Access to cloud scale compute

Distributed training using 100's of GPUs/TPUs to train your neural network in minutes

Serve your model & scale for million of predictions/sec.

Pay per second in Cloud/Serverless with Cloud ML



Leverage easy to use libraries such as Keras to quickly prototype your deep learning network architectures



Develop easily using Deep Learning frameworks

Use algorithms coming out of research community using Tensorflow Canned estimators



Repurpose existing models such as inception for your market needs

Create solutions using AI Services

Affordable access to AI API



Next

Jump start your 1st experiment

You will be a leader!

<https://github.com/rajagopalmotivate1/AILab>

For more like this, <https://sites.google.com/view/AIforEveryone>