

Software 2.0

Let's force computers to grow wiser!

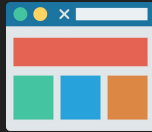


Software 1.0

Explicit instructions to the computer written by a programmer



Calculator



Web Page



Application

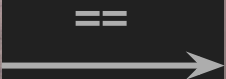


What is the problem?

Face Recognition By Software 1.0



Face Recognition By Software 1.0



Pixel View

Face Recognition By Software 1.0



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Pixel View

If ...
If ...
If ...
If ...

I(0,0)	I(1,0)	I(2,0)	I(3,0)	I(4,0)	I(5,0)	I(6,0)
I(0,1)	I(1,1)	I(2,1)	I(3,1)	I(4,1)	I(5,1)	I(6,1)
I(0,2)	I(1,2)	I(2,2)	I(3,2)	I(4,2)	I(5,2)	I(6,2)
I(0,3)	I(1,3)	I(2,3)	I(3,3)	I(4,3)	I(5,3)	I(6,3)
I(0,4)	I(1,4)	I(2,4)	I(3,4)	I(4,4)	I(5,4)	I(6,4)
I(0,5)	I(1,5)	I(2,5)	I(3,5)	I(4,5)	I(5,5)	I(6,5)
I(0,6)	I(1,6)	I(2,6)	I(3,6)	I(4,6)	I(5,6)	I(6,6)

×

H(0,0)	H(1,0)	H(2,0)
H(0,1)	H(1,1)	H(2,1)
H(0,2)	H(1,2)	H(2,2)

Filter

=

O(0,0)						

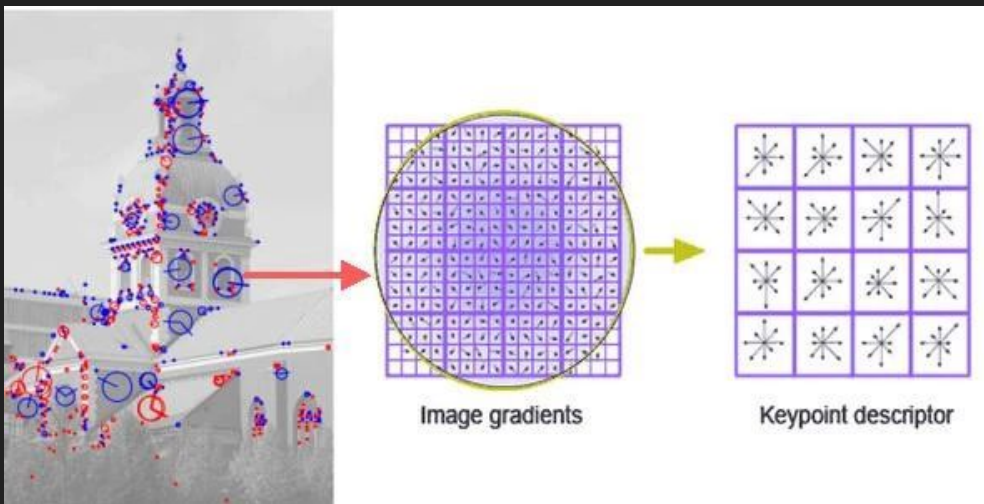
Input image

Output image



Human Engineered!

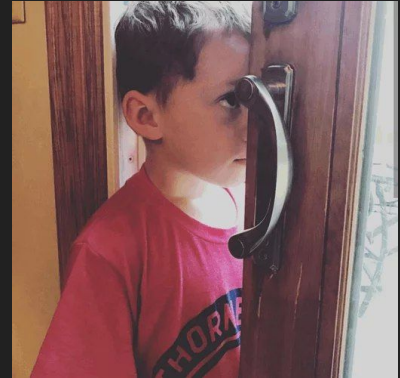
Problem of generalization



But ...



But ...



- **Customer Behavior Analysis**
- **Stock Market Prediction**
- **Weather Forecasting**
- **Speech Recognition**
- **Machine Translation**
- **Autonomous Cars**
- **Cancer Detection**
- **Object Detection**
- **etc.**



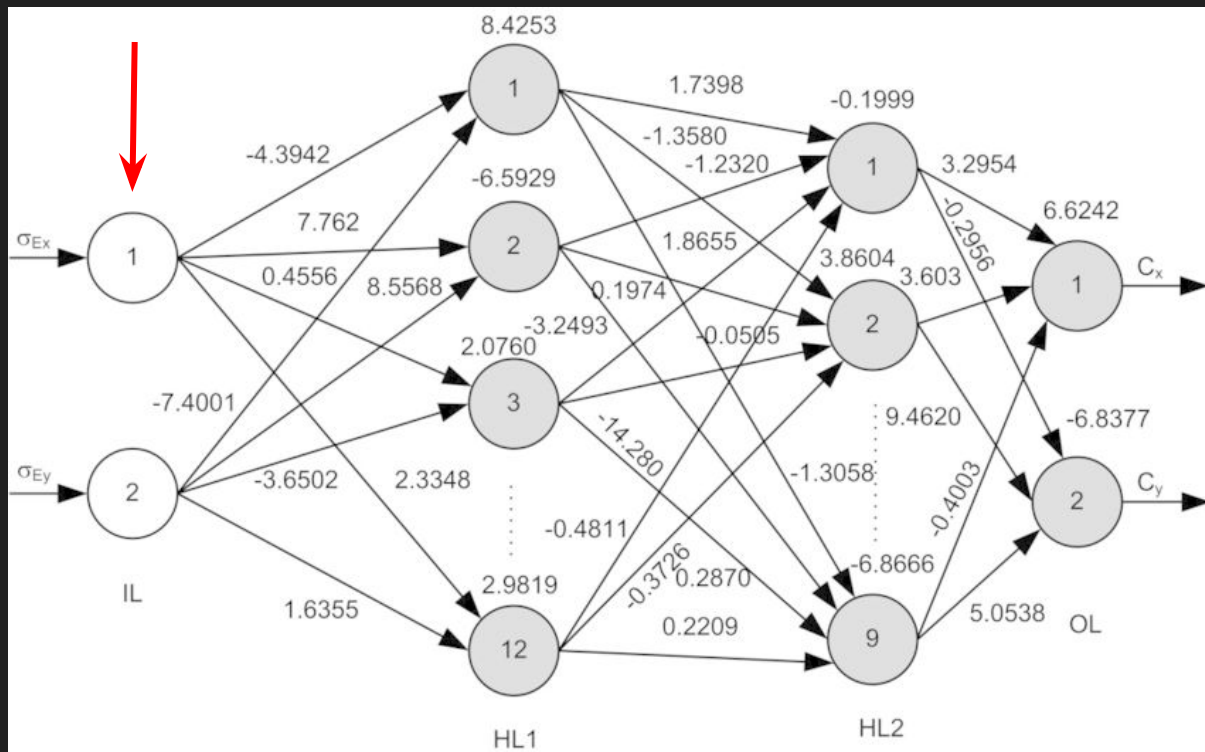
Paradigm Shift

Software 2.0

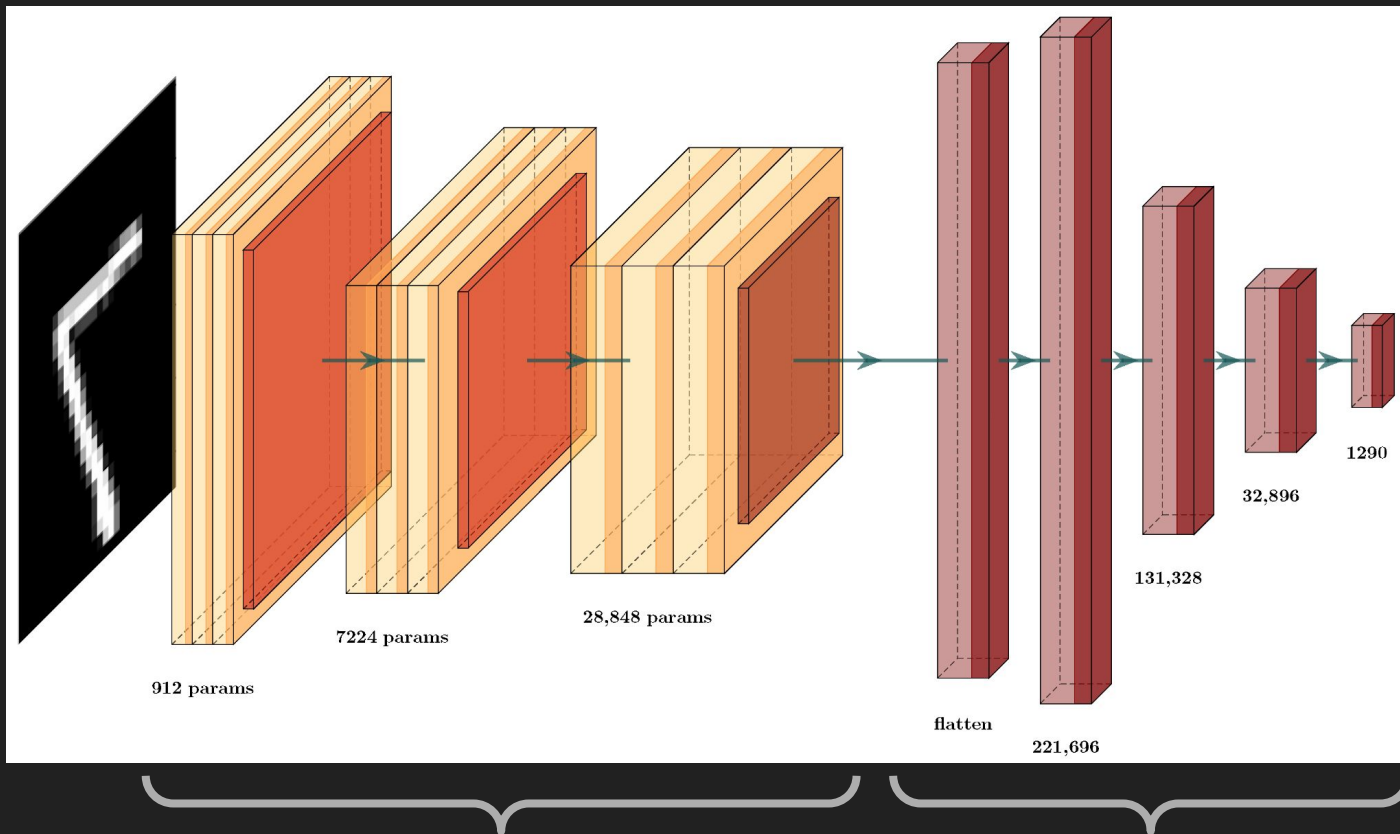


A software that writes codes itself!

Weights Instead of human!



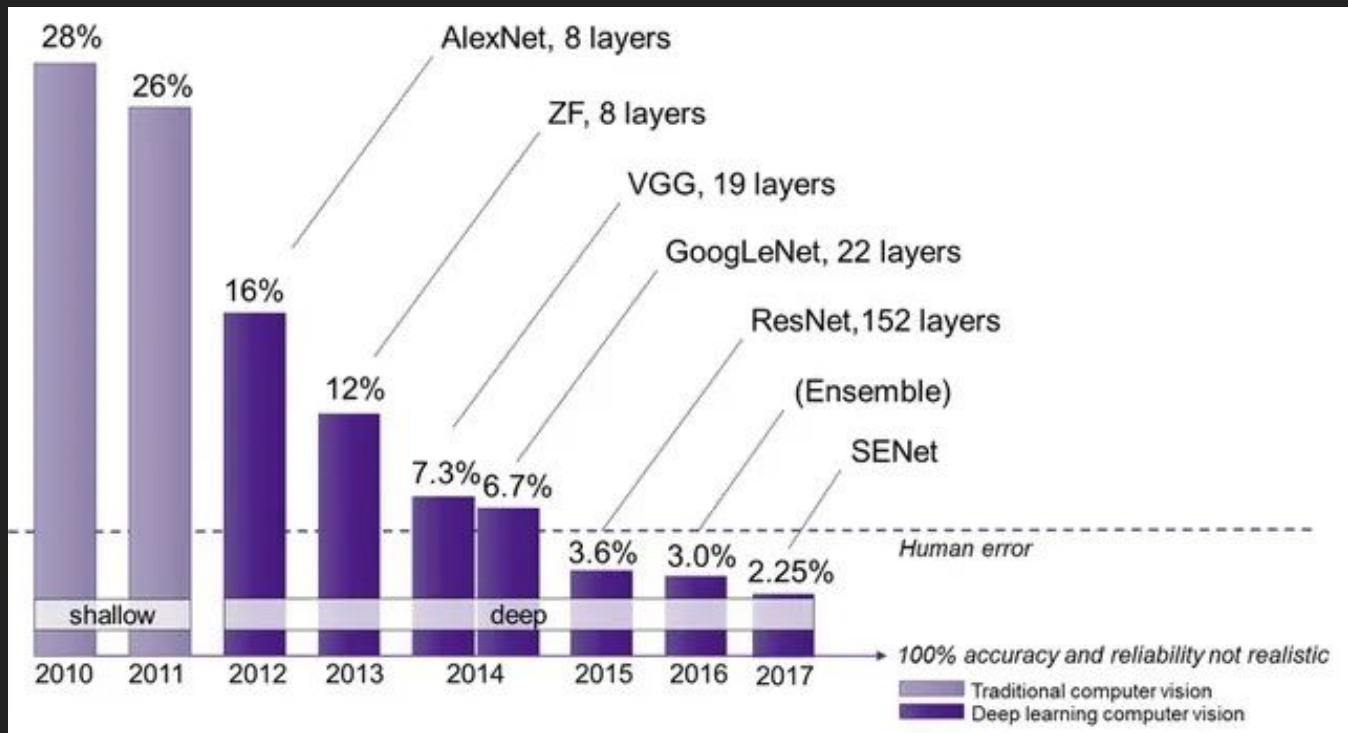
- 1- Define Architecture
- 2- Learning Process:
 - Forward Pass
 - Backward Pass



Feature Extraction

Classification Head

Better than you!





Andrej Karpathy 

@karpathy



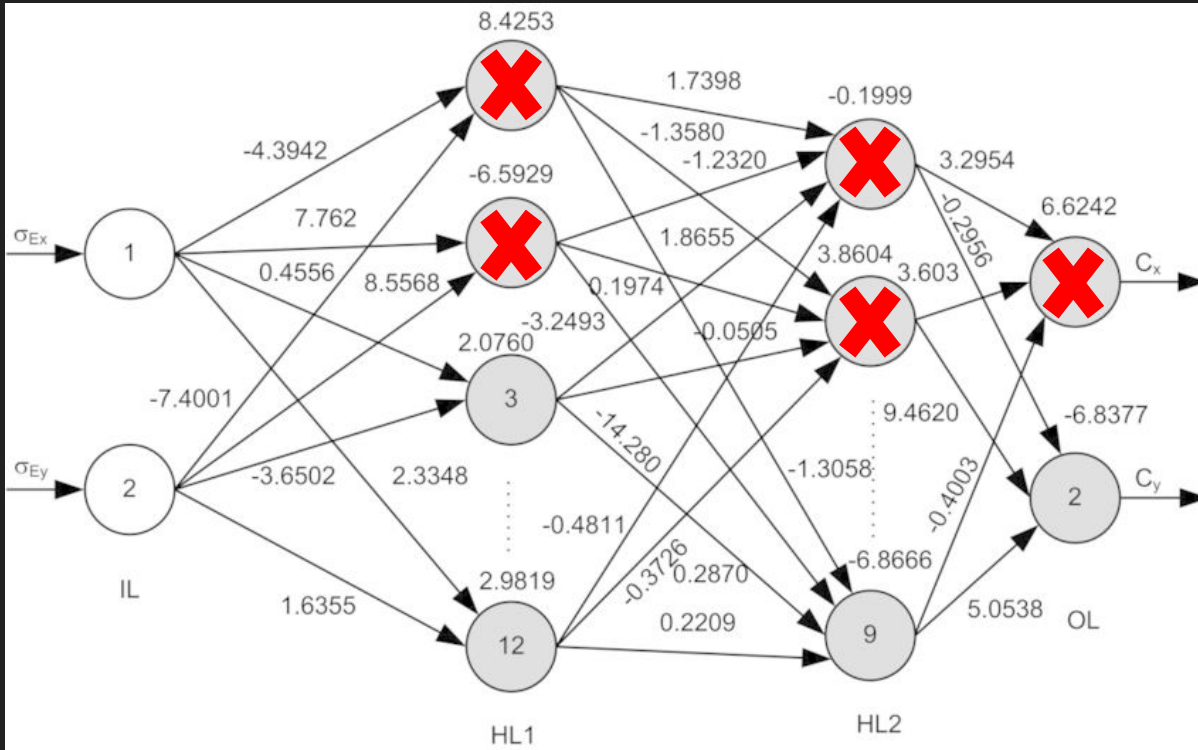
Gradient descent can write code better than you. I'm sorry.

1:26 AM · Aug 5, 2017 · Twitter Web Client

493 Retweets 101 Quote Tweets 2,706 Likes



Agile

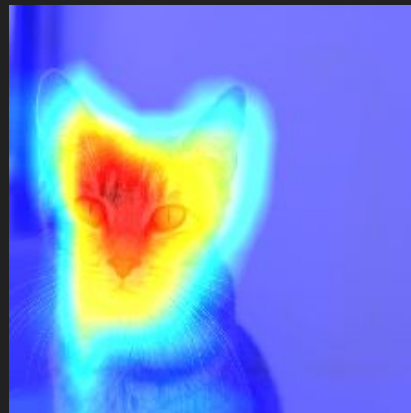


~~Dropout~~

Disadvantages

- Model Explainability
- Model Accuracy

GitHub: `tf-explain`





Andrej Karpathy

Director of artificial intelligence and Autopilot Vision at Tesla

<https://karpathy.medium.com/software-2-0-a64152b37c35#:~:text=Software%20.0%20is%20code%20written,you%20classify%20some%20images%20correctly%3F>

