Microsoft

Azure Developer Tour

#azuredevtour

aka.ms/devtourcode

@azureadvocates

Azure

Productive + Hybrid + Intelligent + Trusted

Demo: A Lap Around Azure

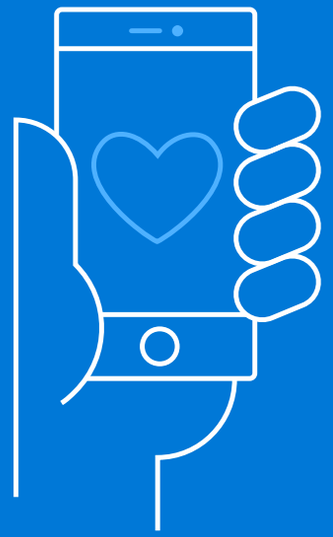
Web Apps

DevOps CI/CD

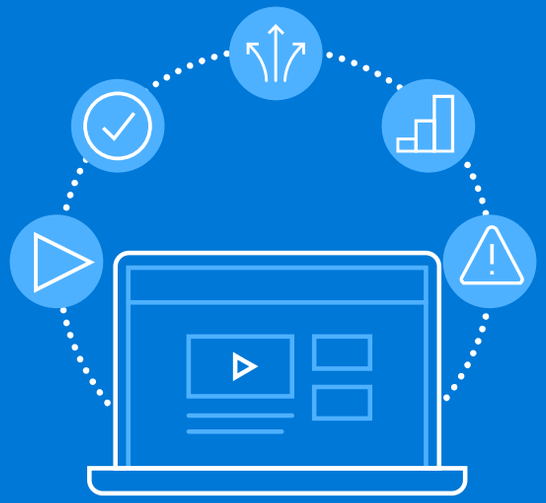
Security

Mobile

Essentials for mobile success



Beautiful native apps



Build, test, distribute, learn

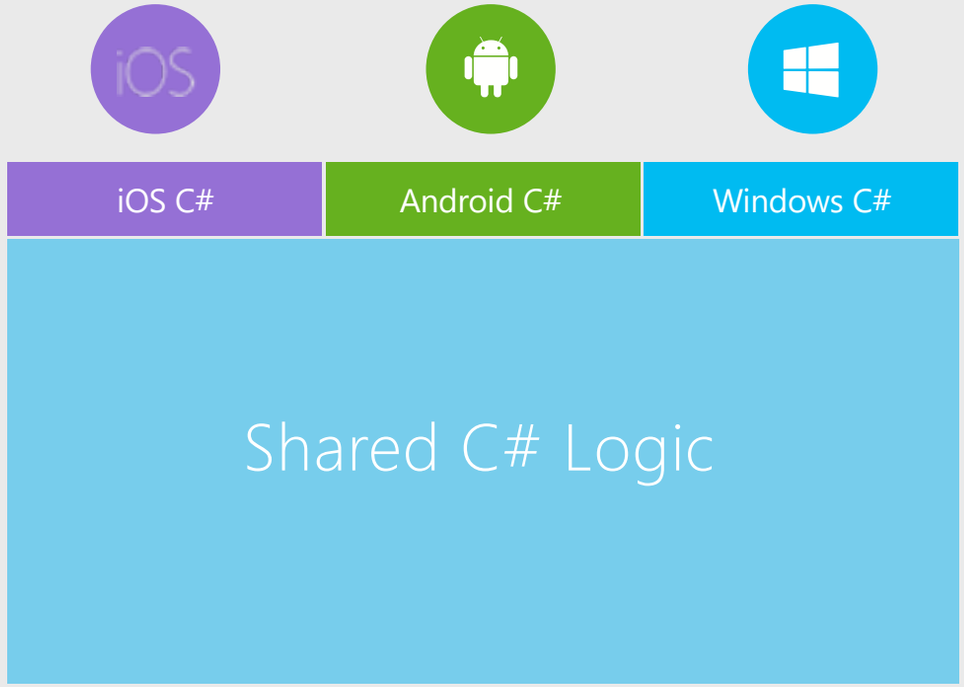
Intelligent cloud

+

Azure

The Best Way to Build Cloud-Connected Mobile Apps

Xamarin Native – Traditional UI



- 3 Native User Interfaces
- Shared App Logic

Xamarin.Forms- Cross Platform UI

- Shared Native User Interface
- Shared App Logic

Demo: Xamarin

Containers

Deploy containers everywhere in Azure

Azure Container Instances

Easily deploy and run containers with a single command

Launch container instances in seconds

Cost effective per second billing

Azure Container Service (AKS)

Fully managed Kubernetes orchestration service

Auto patching, auto scaling, auto updates

Use the full Kubernetes ecosystem

Azure and Azure Stack

The latest containers news

- ACI: Generally Available
- AKS: Generally Available very soon!
- Azure DevOps Project
- VS Code: Debug in-cluster containers using Draft Open Service Broker for Azure
- Azure Dev Spaces

Serverless

No infrastructure management

Pay for what you use

Infinite scale

Focus on your code

Serverless

Azure Functions

Powerful triggers and bindings

HTTP as a first class citizen

Best-in-class tooling

Open source

Pay per execution

AI and Machine Learning

data
science

machine learning

- finding (and exploiting) patterns in data
- replacing “human writing code” with “human supplying data”
  - system figures out what the person wants based on examples
  - need to abstract from “training” examples to “test” examples
  - most central issue in ML: generalization
- starts with a *sharp* question

machine learning

- how much / how many
- which class does this belong to?
- are there different groups? which does it belong to?
- is this weird?
- which option should I choose?

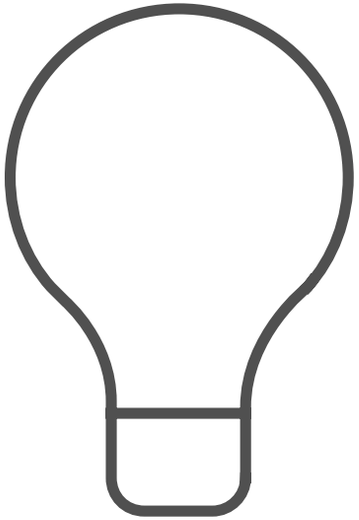
machine learning

supervised

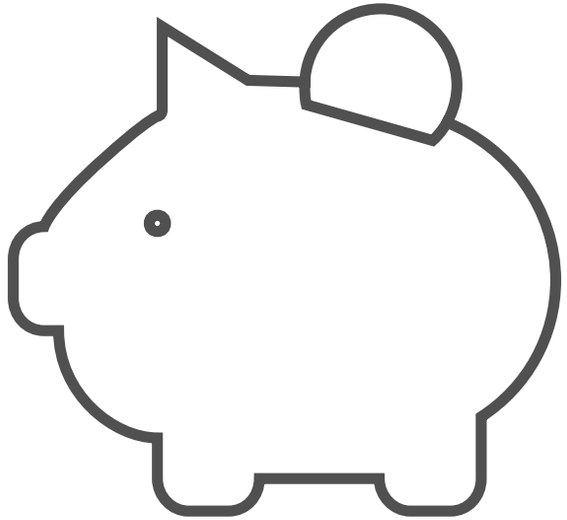
- (regression)
  how much / how many
- (classification)
  which class does this belong to?

unsupervised

- (clustering)
  are there different groups? which does it belong to?
- (anomaly detection)
  is this weird?
- (recommendation)
  which option should I choose?



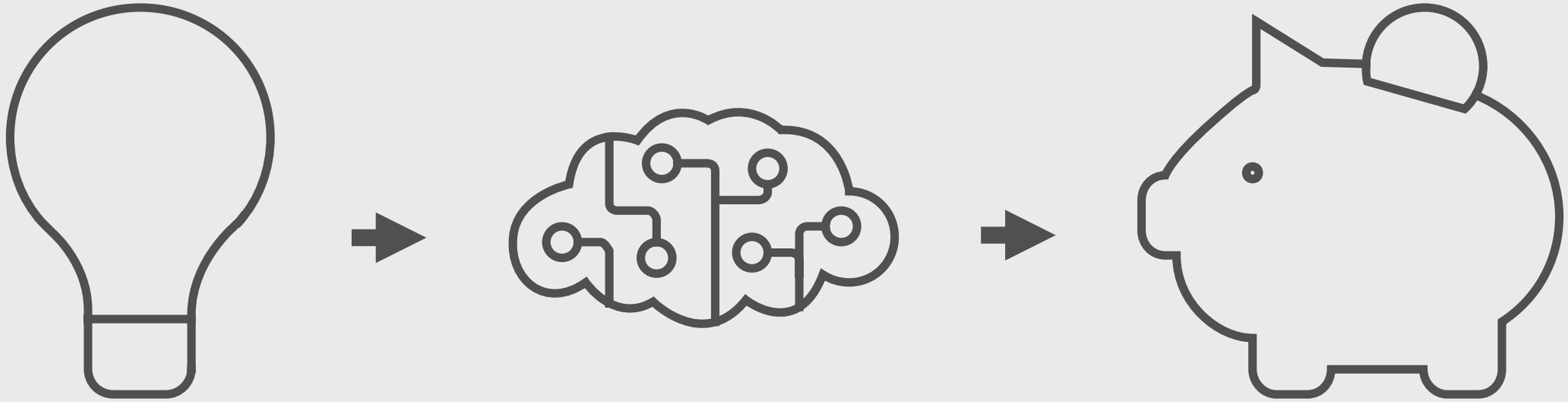
?



idea

profit

option 1 – easy



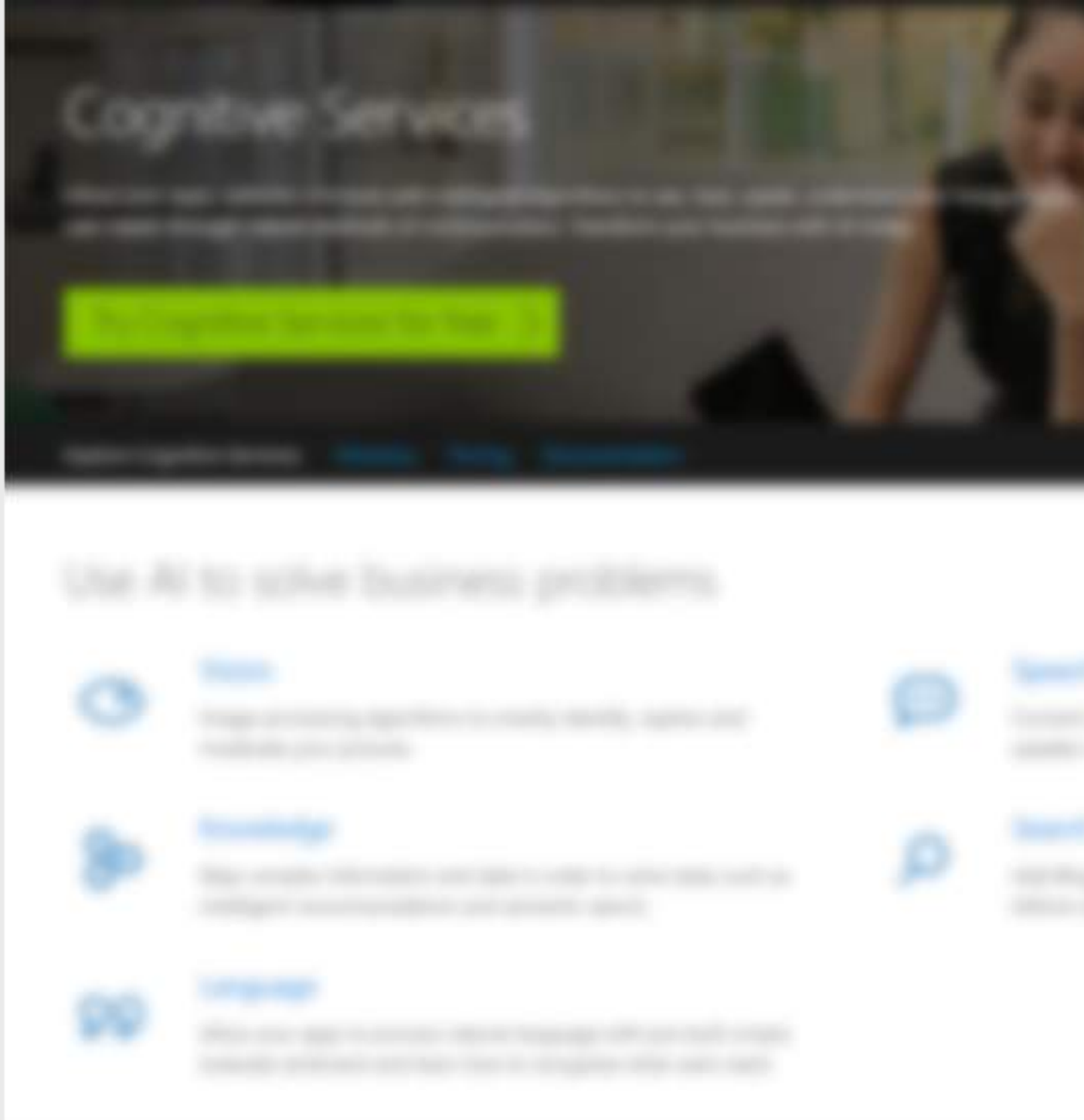
idea

prebuilt AI

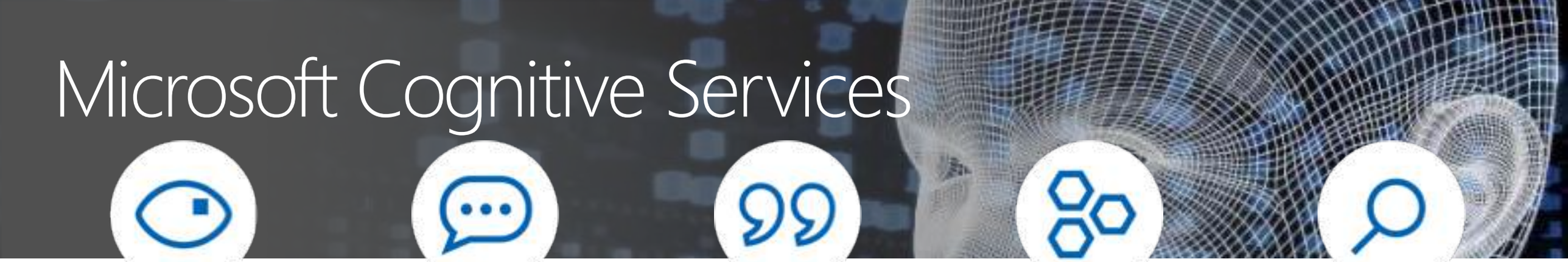
profit

cognitive services

Infuse your apps, websites and bots with intelligent algorithms to see, hear, speak, understand and interpret your user needs through natural methods of communication



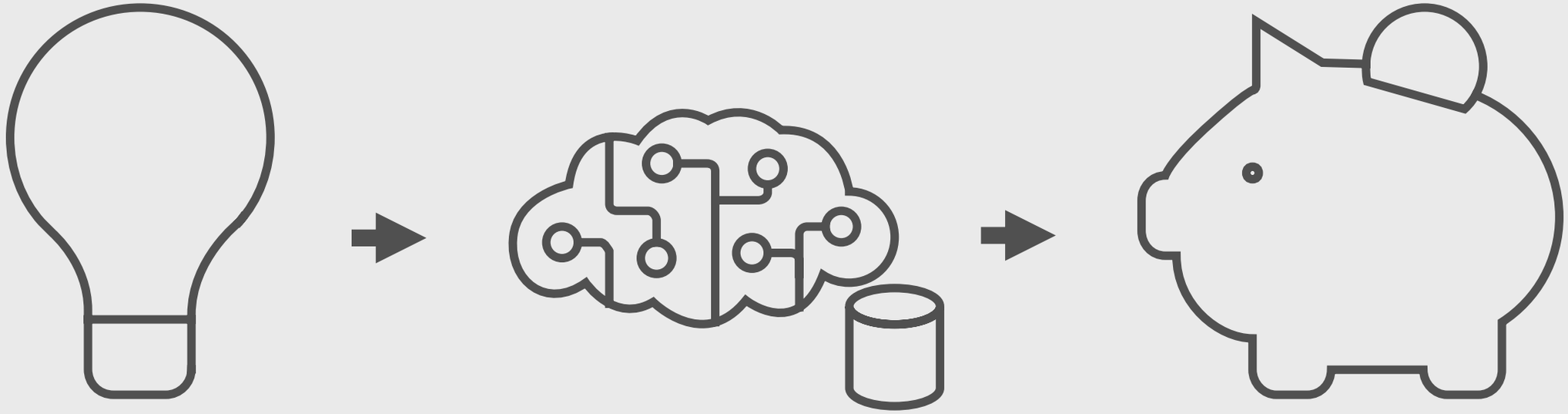
Microsoft Cognitive Services



Vision	Speech	Language	Knowledge	Search
Video Indexer	Speaker Recognition	Text Analytics	QnA Maker	Bing Entity Search
Computer Vision	Bing Speech	Bing Spell Check		Bing Autosuggest
Face	Translator Speech	Translator Text		Bing Search
Emotion	Unified Speech			Bing Statistics add-in
Content Moderator				Bing Visual Search

Demo: Cognitive Services

option 2 – still easy, but more work

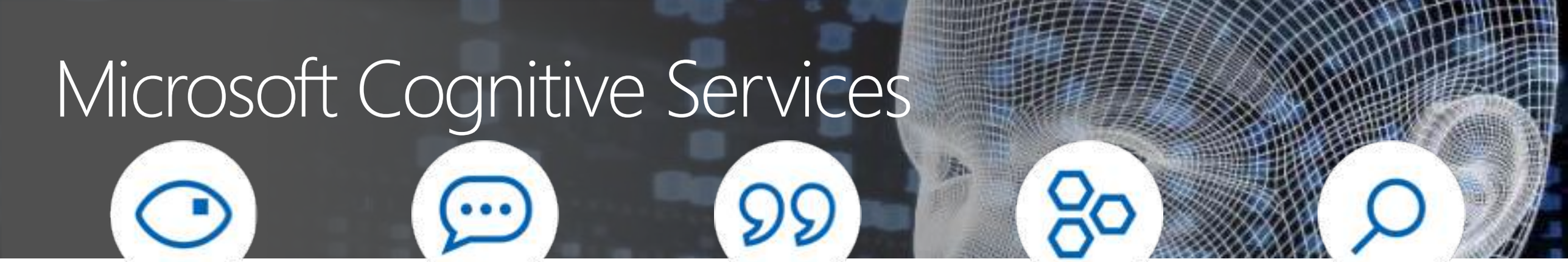


idea

customize
prebuilt AI

profit

Microsoft Cognitive Services



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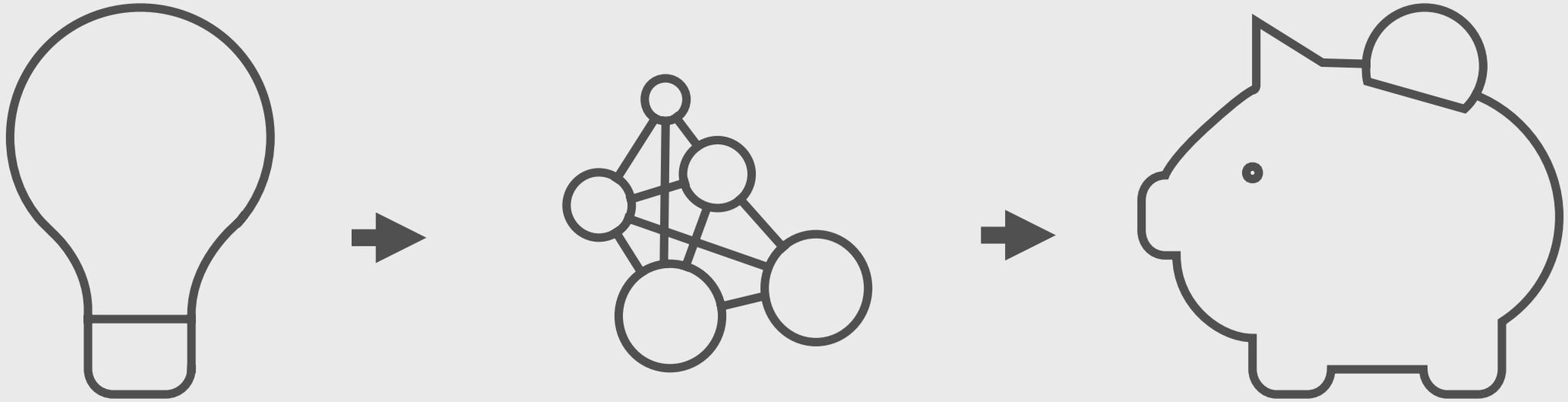
Emotion	Unified Speech			Bing Statistics add-in
Content Moderator				Bing Visual Search

Customization

Custom Vision	Custom Speech	Language Understanding (LUIS)	Custom Decision	Bing Custom Search

Demo: Cognitive Services, Pt 2

option 3 – hands will be dirtied

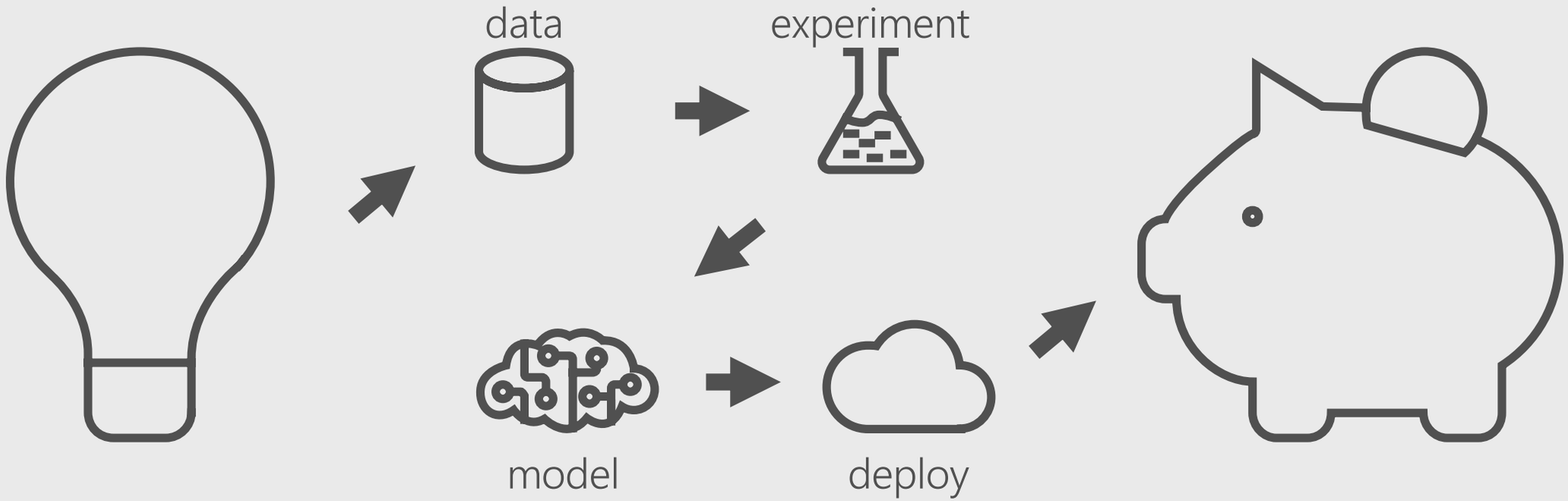


idea

custom AI

profit

option 3



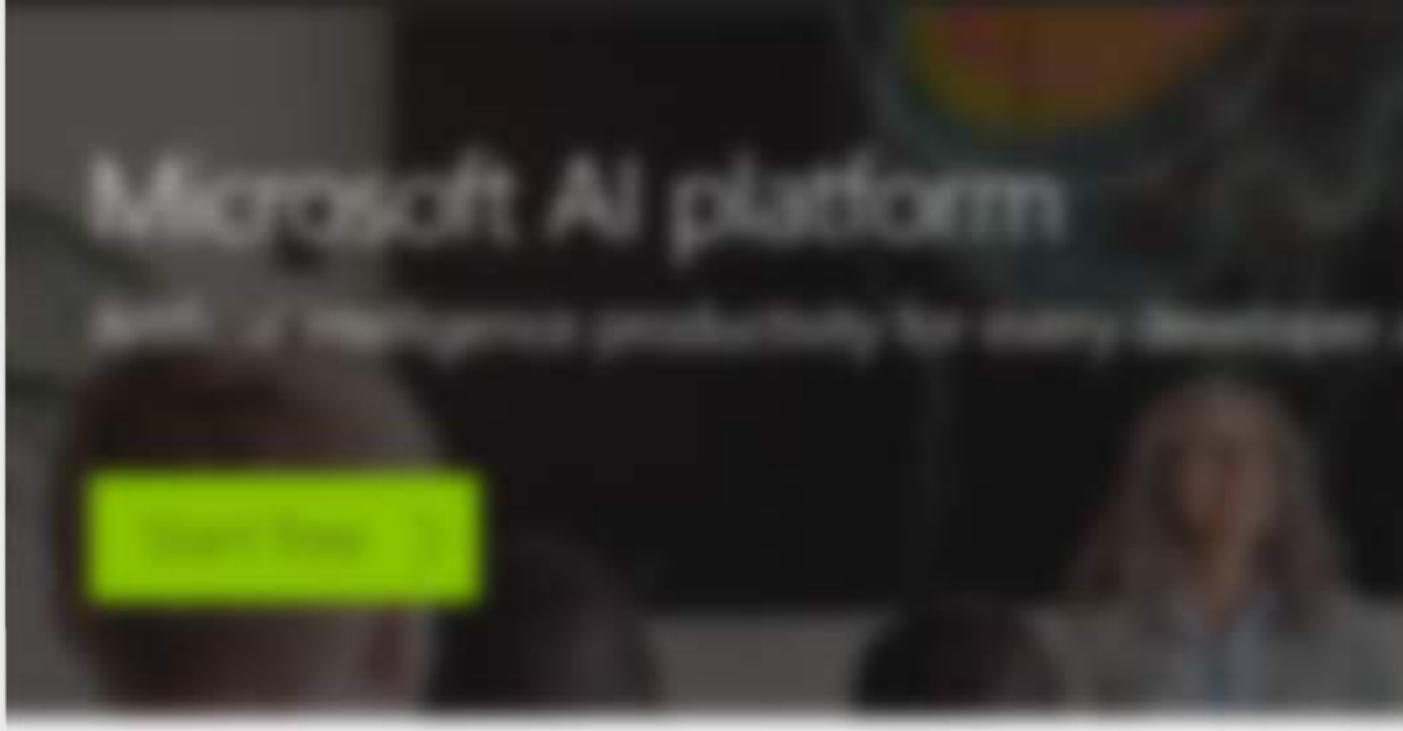
idea

custom AI

profit

AI platform

Artificial Intelligence productivity for every developer and every scenario

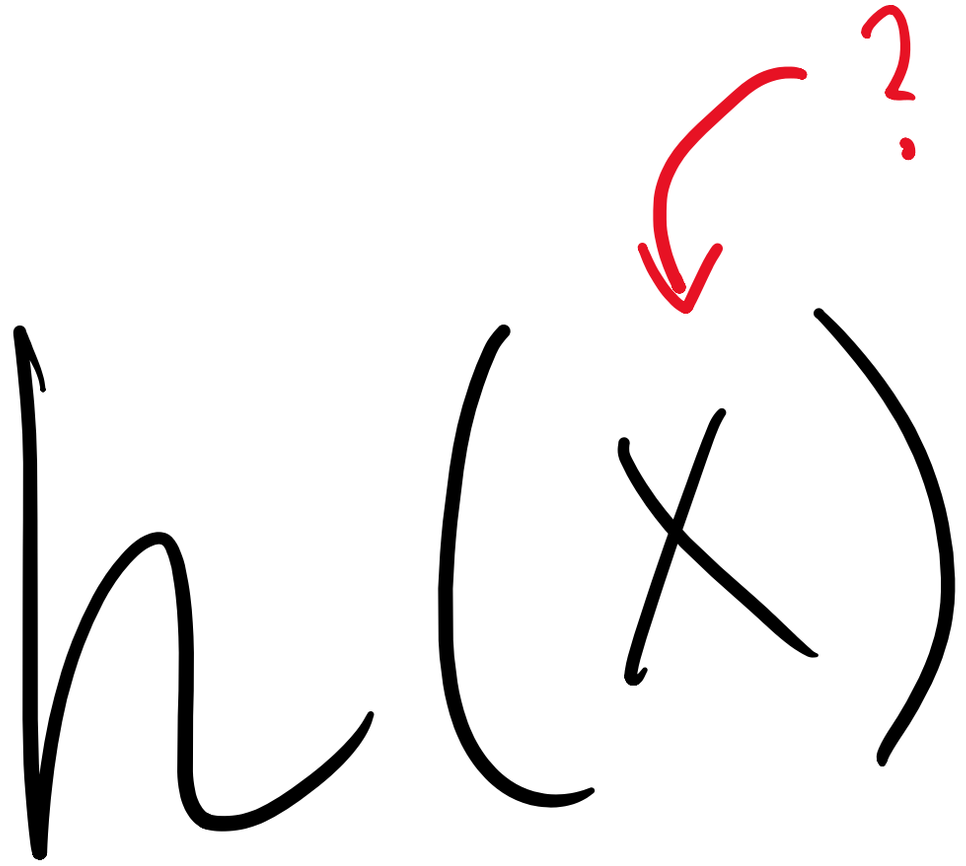


Demo: Deep Learning

(float, float)

getCoolScores(picture)

$h(x)$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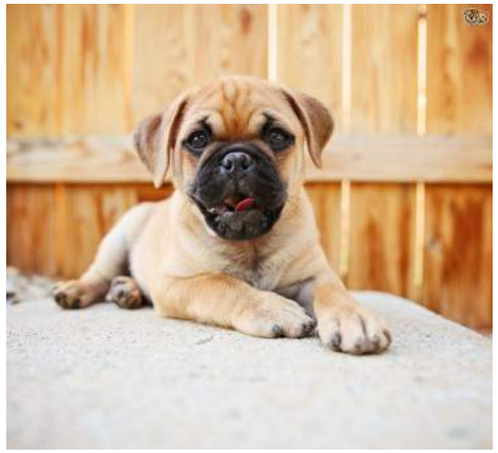
h(x)



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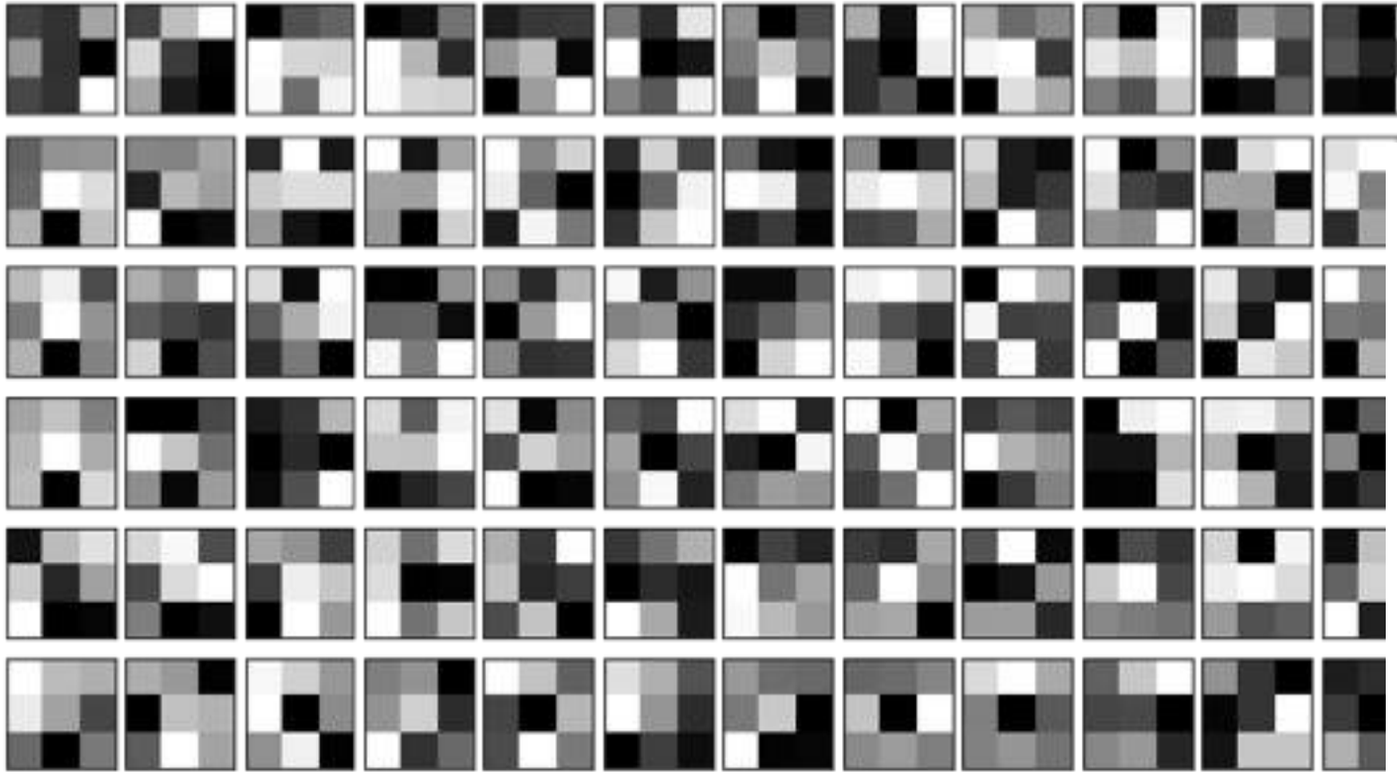
$$h(x)$$



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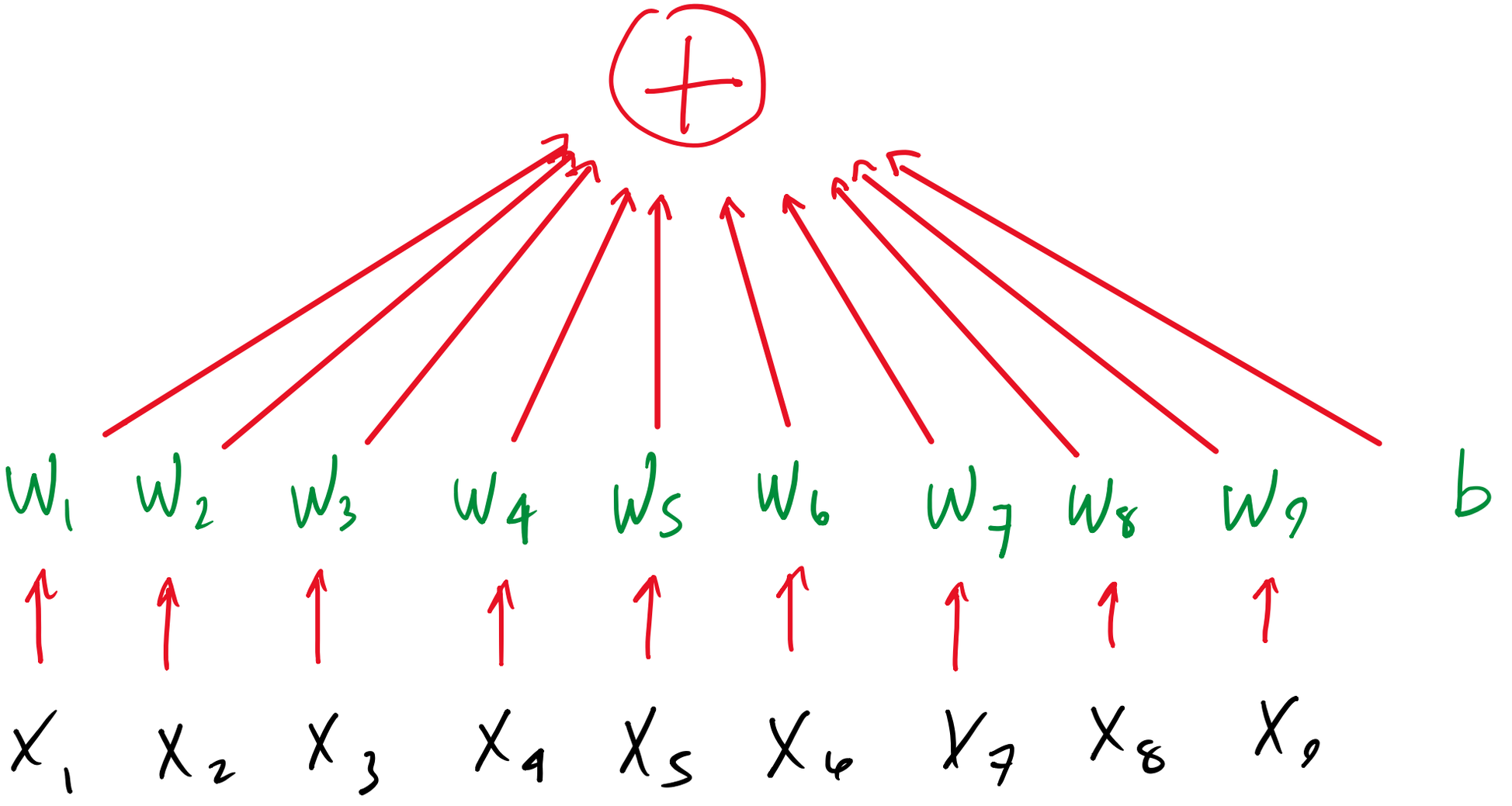
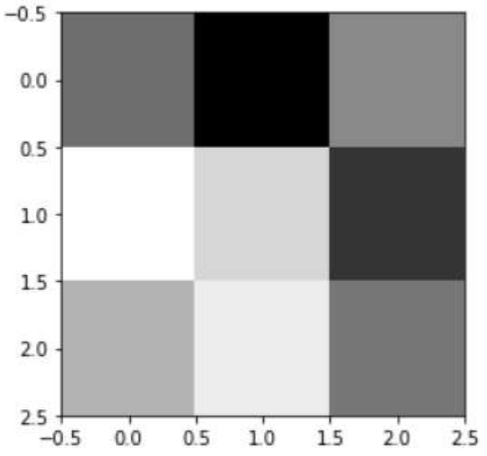

+
w1 w2 w3 w4 w5 w6 w7 w8 w9 b
x1 x2 x3 x4 x5 x6 x7 x8 x9

$$X = [x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9]$$

$$w = [w_1, w_2, w_3, w_4, w_5, w_6, w_7, w_8, w_9]$$

$$w^T x + b$$

$$w^T x = \|w\| \cdot \|x\| \cdot \cos\theta$$

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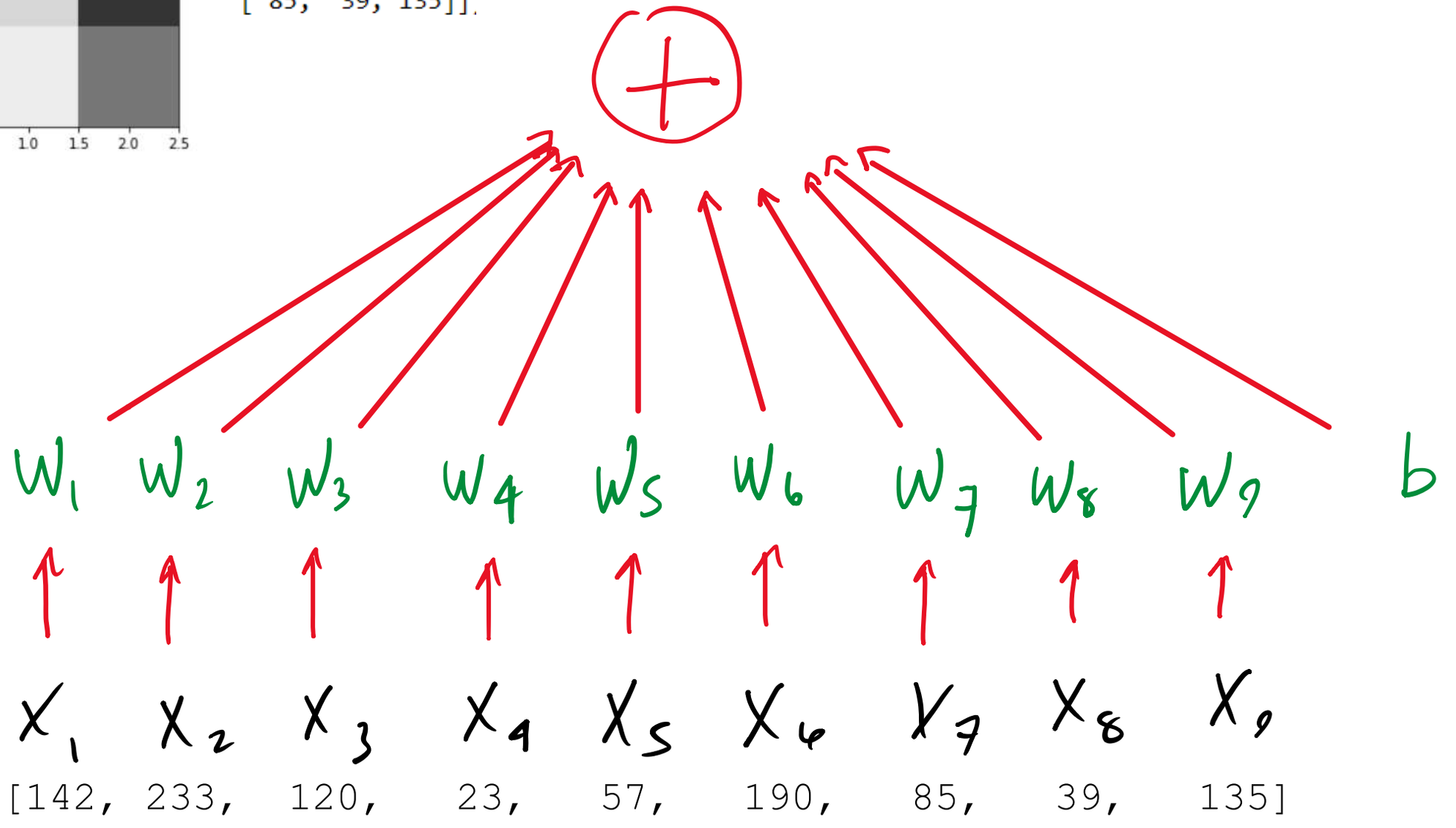

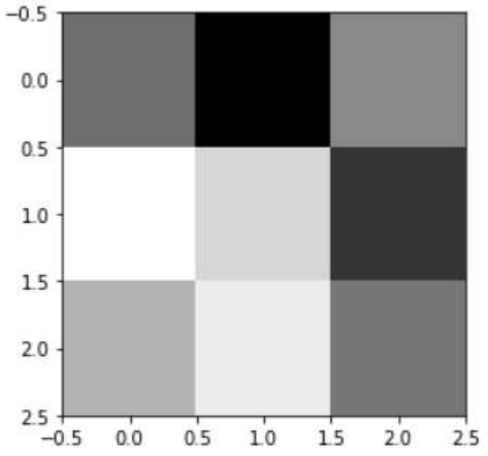


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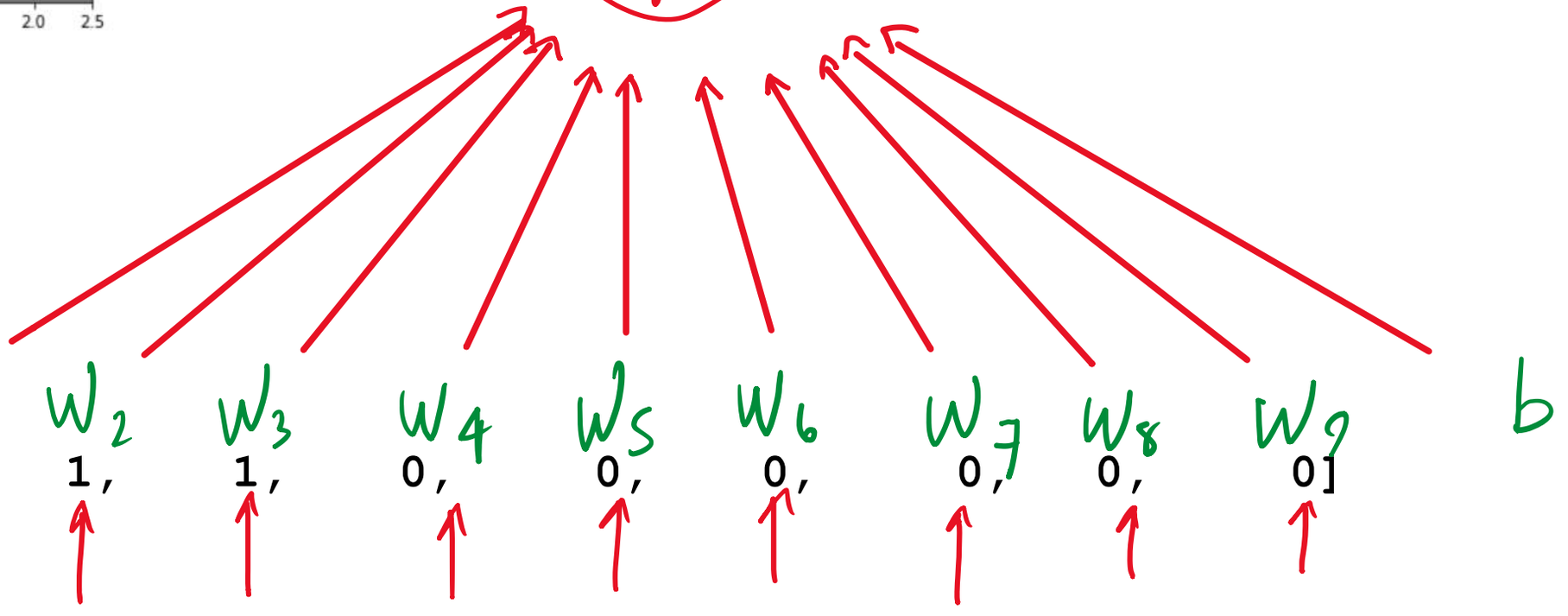

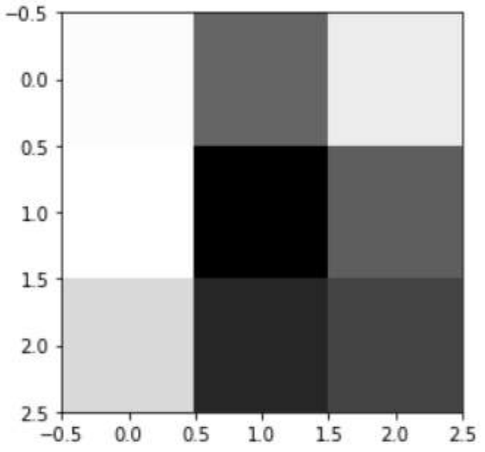


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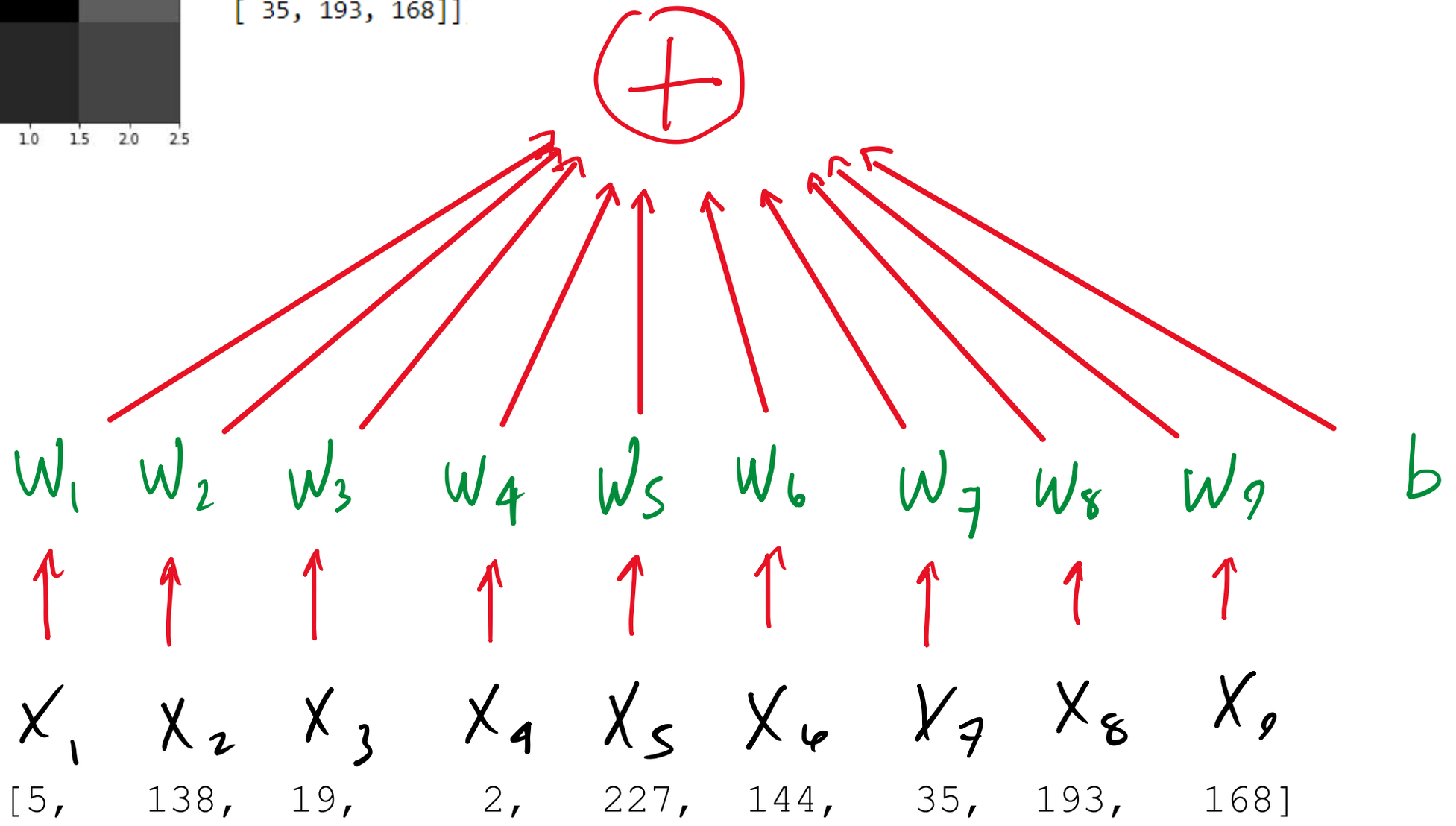

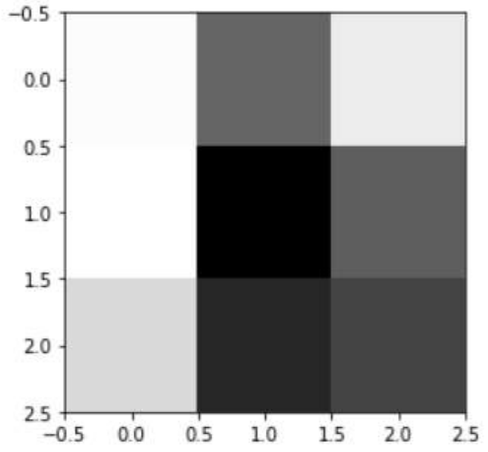


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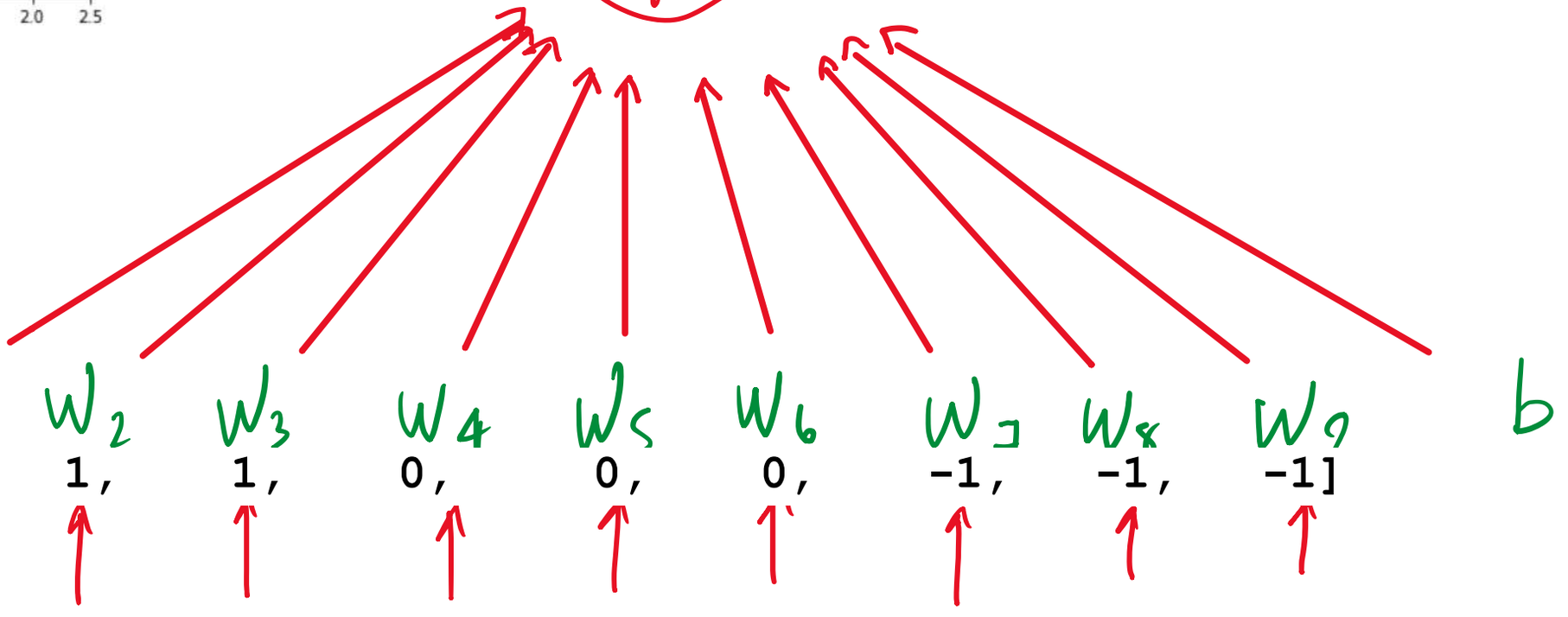
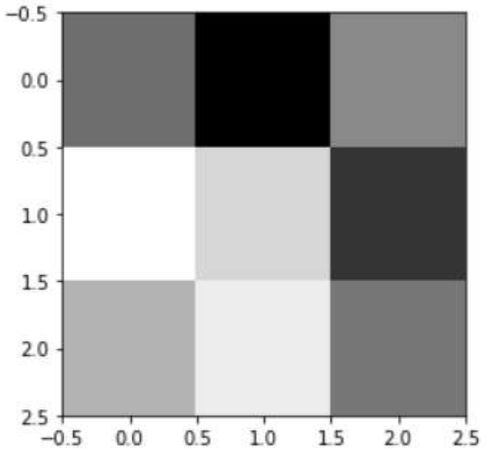


w_1 w_2 w_3 w_4 w_5 w_6 w_7 w_8 w_9 b

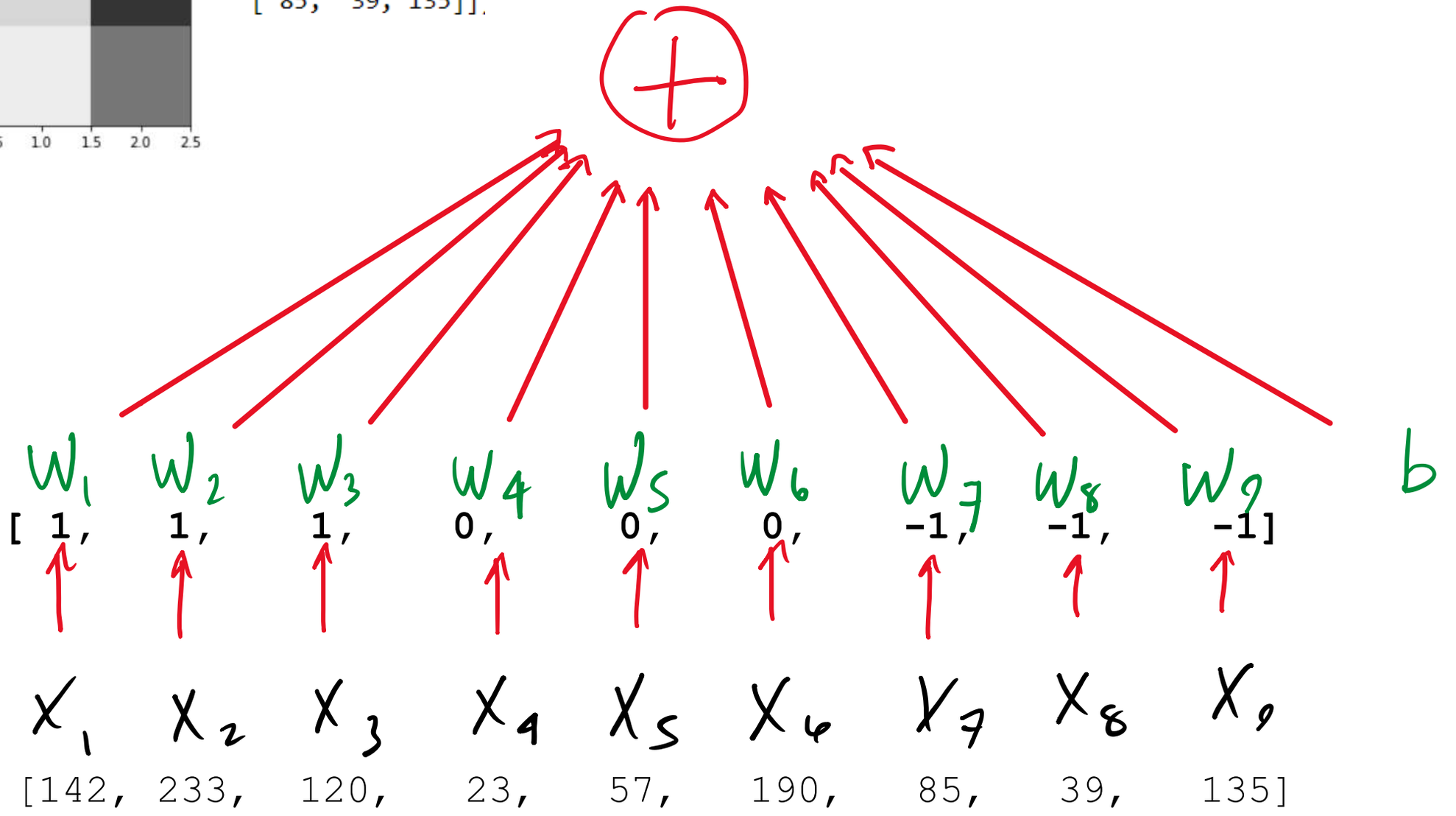
[1, 1, 1, 0, 0, 0, -1, -1, -1]

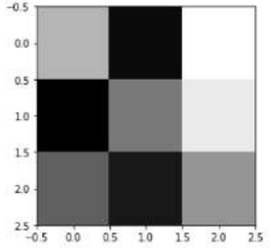
x_1 x_2 x_3 x_4 x_5 x_6 x_7 x_8 x_9

[5, 138, 19, 2, 227, 144, 35, 193, 168]

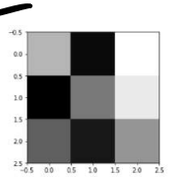



```
[[142, 233, 120],
 [ 23,  57, 190],
 [ 85,  39, 135]]
```



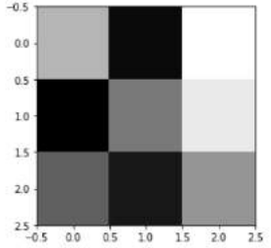


w^T

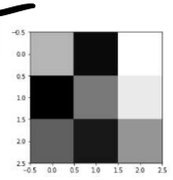


+ = top

− = bottom



w^T



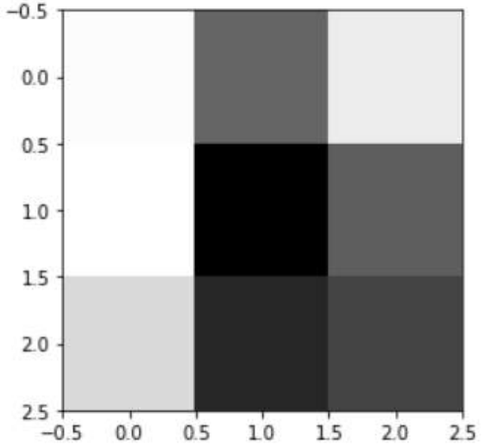
+ = top

− = bottom

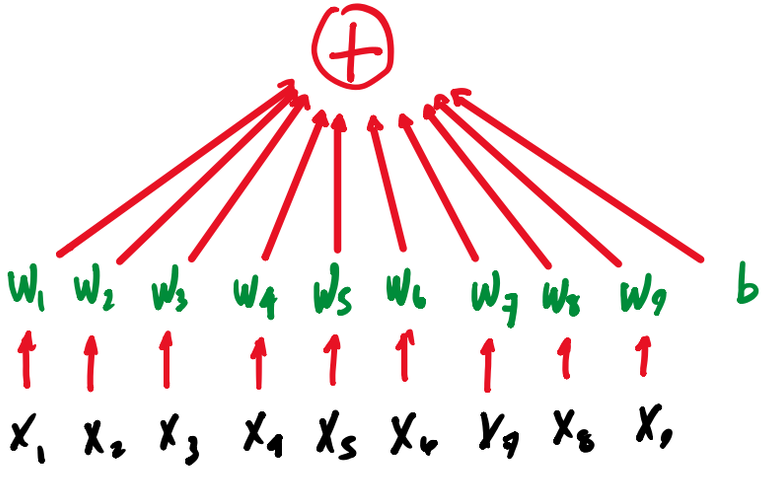
model

prediction

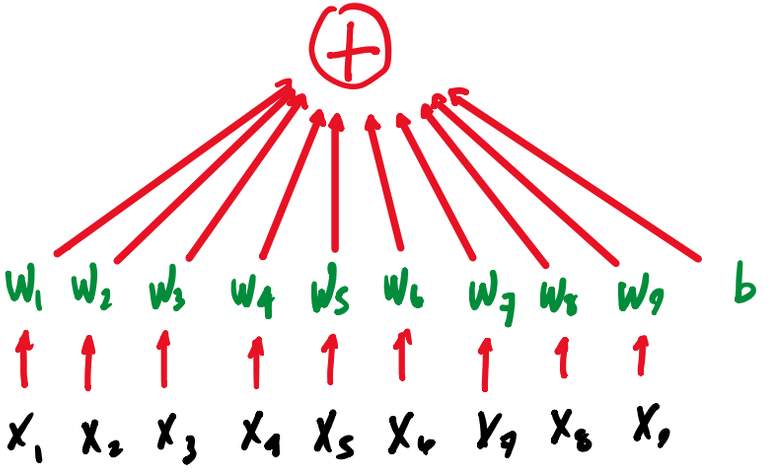
```
[[  5, 138,  19],
 [  2, 227, 144],
 [ 35, 193, 168]]
```



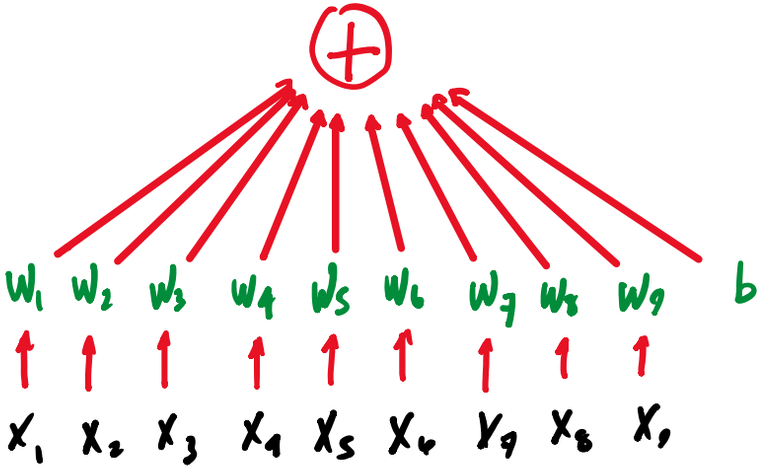
top / middle / bottom ?



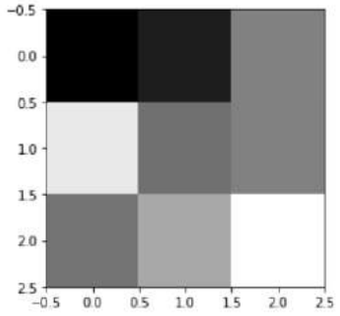
top



middle



bottom



```
[[200, 179, 107],
 [ 34, 120, 108],
 [118,  80,  18]]
```

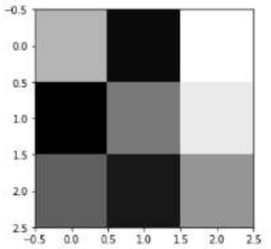
$$\begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 200 \\ 179 \\ 107 \\ 34 \\ 120 \\ 108 \\ 118 \\ 80 \\ 18 \end{bmatrix} = \begin{bmatrix} 486 \\ 262 \\ 216 \end{bmatrix}$$

$$W \qquad X$$

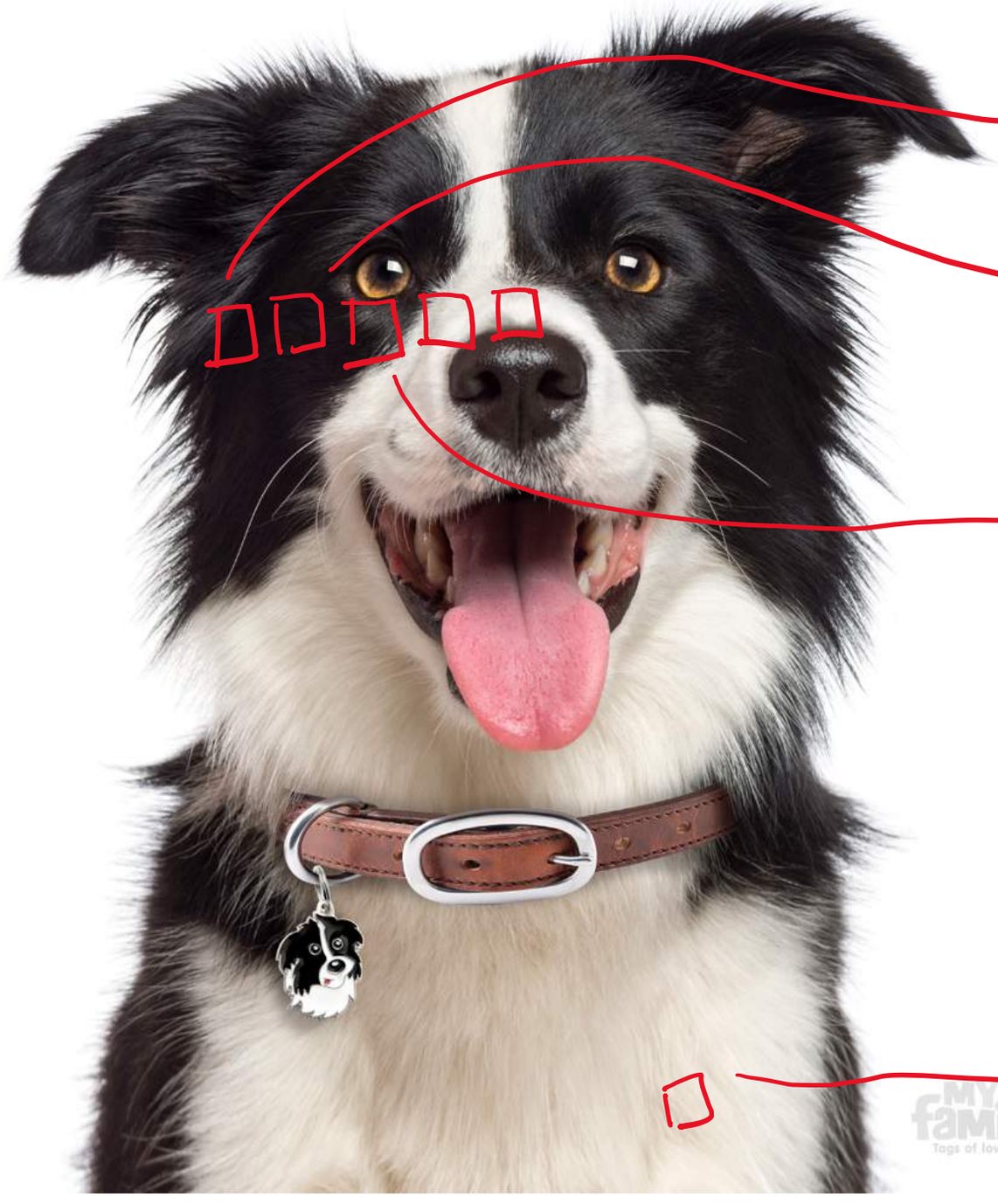
$$\varphi(\quad) = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

top / middle / botton

$$\varphi\left(W^{T}x + b\right)$$



→ dog | cat



$$\varphi(w_1^T x + b_1) \rightarrow$$

$$\varphi(w_2^T x + b_2) \rightarrow$$

$$\varphi(w_3^T x + b_3) \rightarrow$$

$$\vdots$$

$$\varphi(w_n^T x + b_n) \rightarrow$$

$\varphi(w_1^T x + b_1) \rightarrow$

$\varphi(w_2^T x + b_2) \rightarrow$

$\varphi(w_3^T x + b_3) \rightarrow$

$\vdots$

$\varphi(w_n^T x + b_n) \rightarrow$

$$\begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ \vdots \\ a_n \end{bmatrix} \longrightarrow$$

do it again!

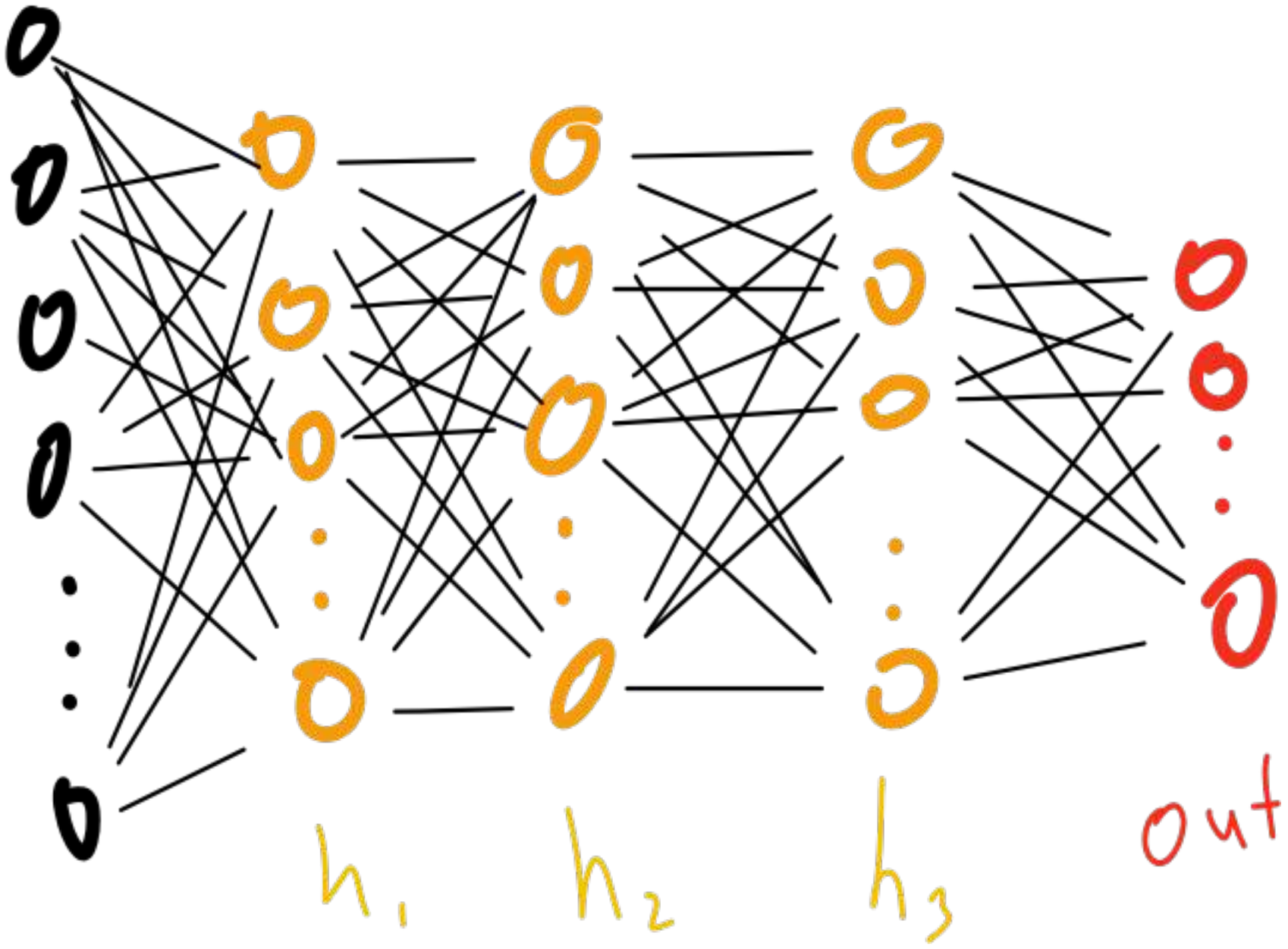
$\varphi(w_1^T x + b_1) \rightarrow$

$\varphi(w_2^T x + b_2) \rightarrow$

$\varphi(w_3^T x + b_3) \rightarrow$

$\vdots$

$\varphi(w_n^T x + b_n) \rightarrow$



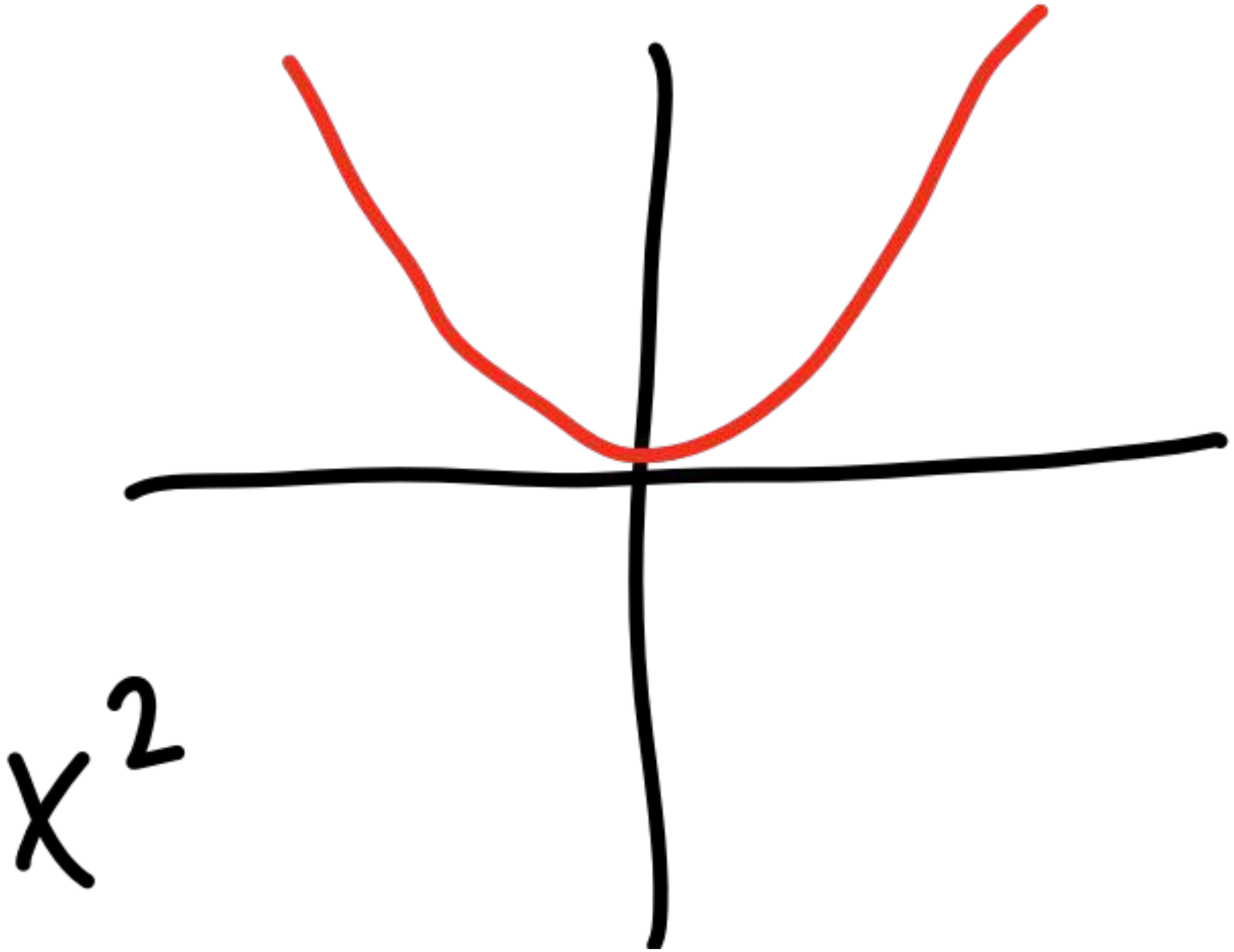
how do we get all the W's + b's ??

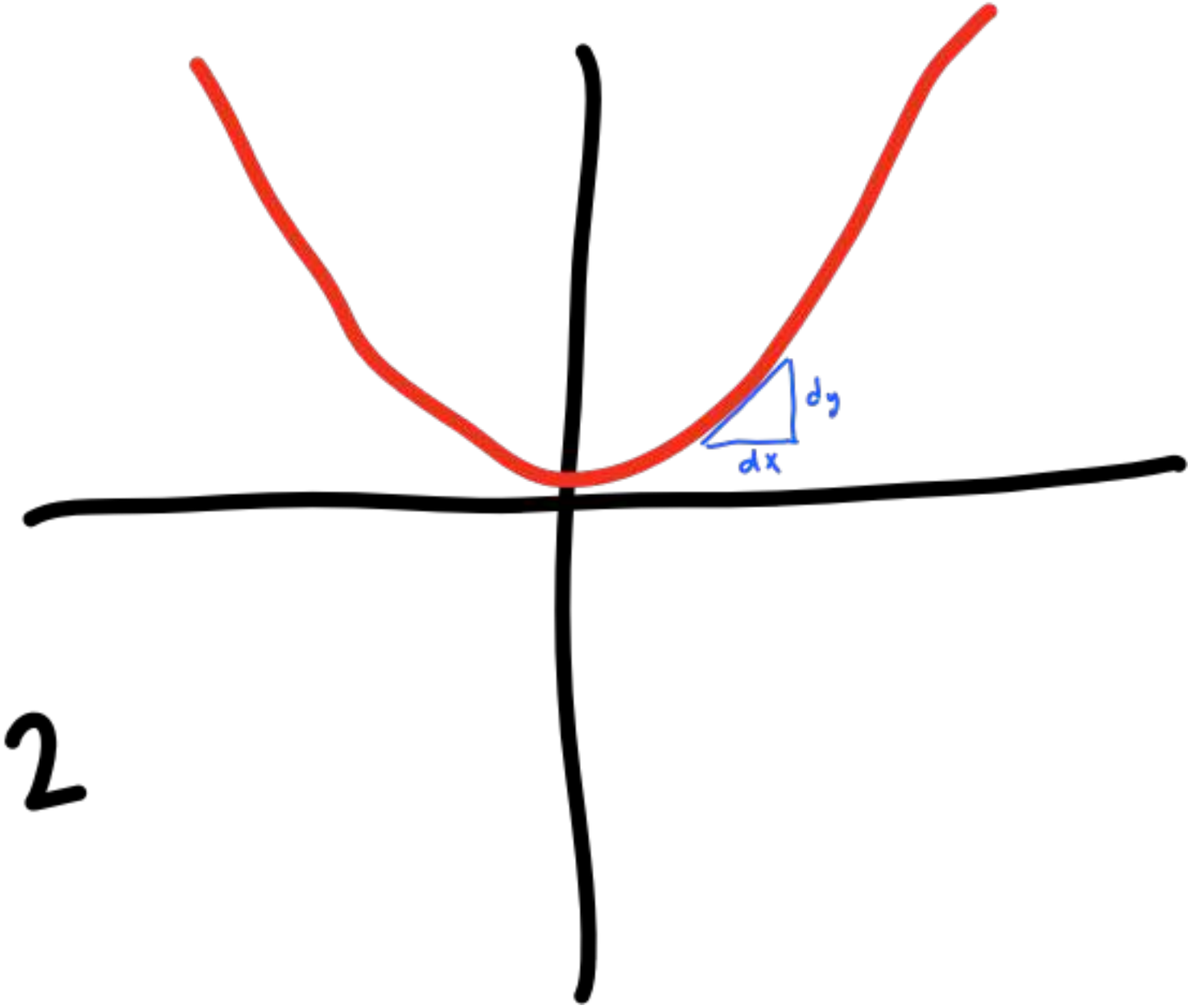
we want to minimize mistakes

$$J(W_s, b_s) =$$

$$\frac{1}{n} \sum_{n} \| h(x) - y \|^2$$

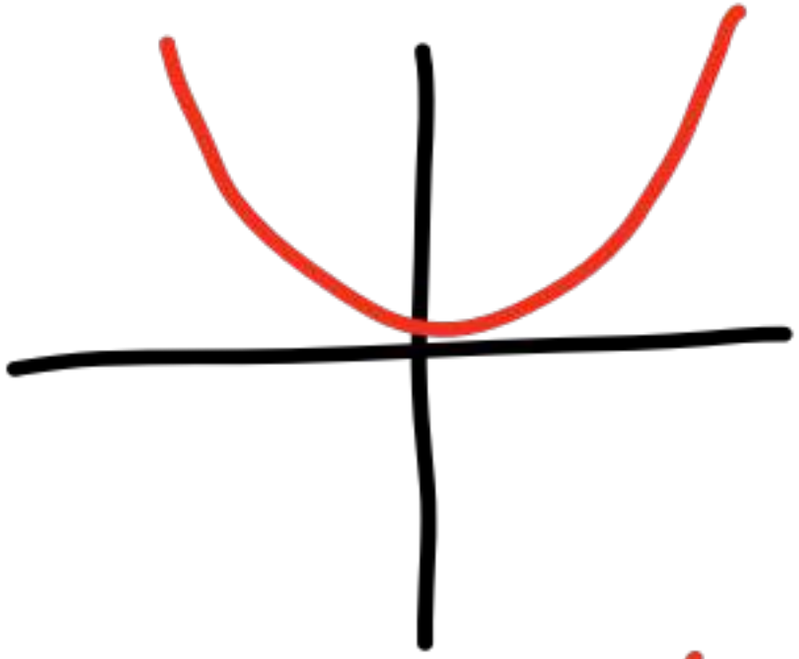
$W's, b's$


x^2

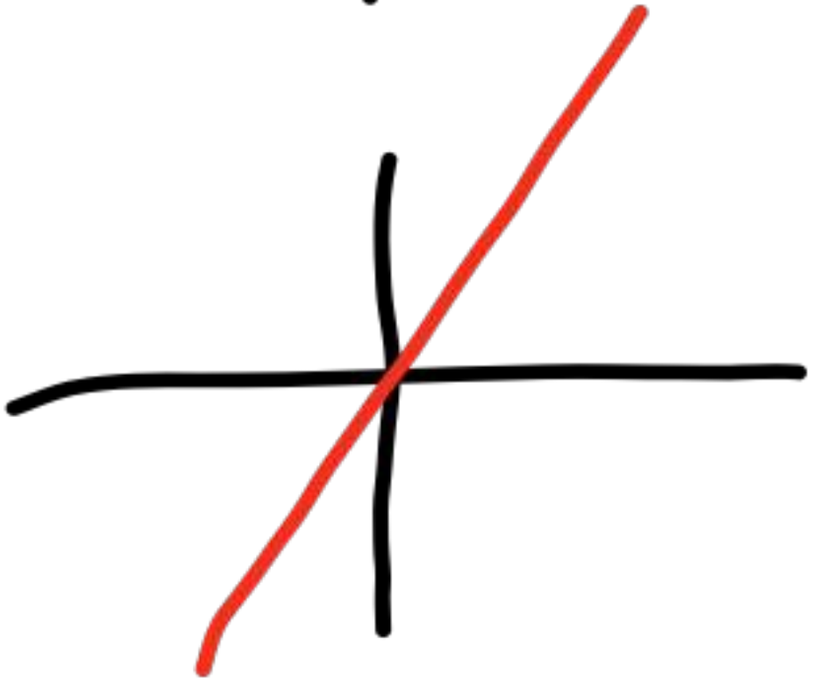


x^2

$$x^2$$



$$\frac{d}{dx} x^2 = 2x$$



learning rate

$$W_1 := W_0 - \alpha \frac{d}{dw} J(w)$$

updated W

current W

derivative of cost function

learning rate

$$W_1 := W_0 - \alpha \nabla J(W_0)$$

updated W

current W

gradient of cost function

so far…

- x – incoming images
- y – classification answer
- model function –
- loss / cost function – mean squared error
- optimization method – gradient descent

Demo: Deep Learning in Action

find out more!

- Learn more about
  - Cognitive Services – https://aka.ms/cogsvcs
  - Azure ML – https://aka.ms/azuremlbuild
  - Visual Studio Tools for AI - https://aka.ms/vstoolsforai
  - Deep Learning VMs - https://aka.ms/dlvmbuild
  - Batch AI – https://aka.ms/batchaibuild
  - ML.Net - https://docs.microsoft.com/en-us/dotnet/machine-learning/
- azure.com/ai

Demo: Azure Functions

Thank you!
#azuredevtour

@azureadvocates

aka.ms/devtourcode