



DEEP LEARNING

REDES NEURAIS

ARTIFICIAIS

PARTE 2

AULA 4



INSTRUÇÕES GERAIS

- ✓ Traga seu laptop



INSTRUÇÕES GERAIS

- ✓ Traga seu laptop
- ✓ Use Software Livre



INSTRUÇÕES GERAIS

- ✓ Traga seu laptop
- ✓ Use Software Livre
- ✓ Não converse por voz



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- ✓ Se não entender, pergunte!



INSTRUÇÕES GERAIS

- ✓ Traga seu laptop
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- ✓ Se não entender, pergunte!
- ✓ Se entender, explique!



INSTRUÇÕES GERAIS

- ✓ Traga seu laptop
- ✓ Use Software Livre
- ✓ Não converse por voz
- ✓ Se não entender, pergunte!
- ✓ Se entender, explique!

✓ **NÃO ENTRE EM
PÂNICO**



BOM DIA!

Eu sou Diego Dorgam

Alguma pergunta que você quer fazer?!

<http://bit.ly/dl-unb04>
<https://t.me/DeepLearningUnB>
@diegodorgam



O QUE APRENDEMOS NA AULA PASSADA?

1. Intuição

- O que é o Neurônio
- Funções de Ativação
- Funcionamento das Redes Neurais
- Aprendizagem nas Redes Neurais

2. Prática

- Instalando o Keras
- Construindo uma ANN



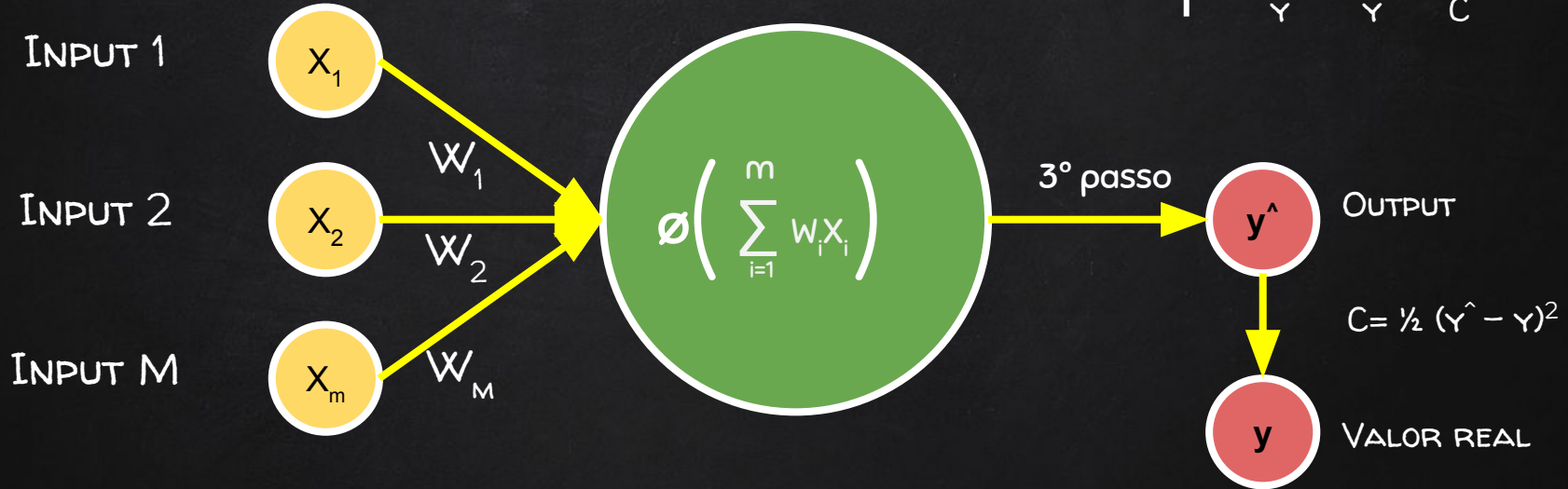
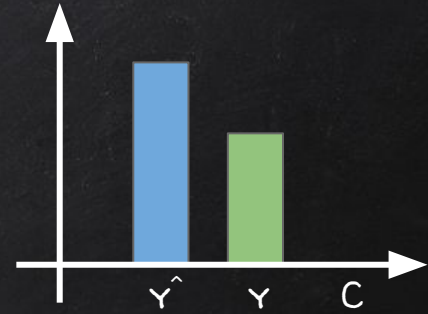
O QUE VAMOS APRENDER?

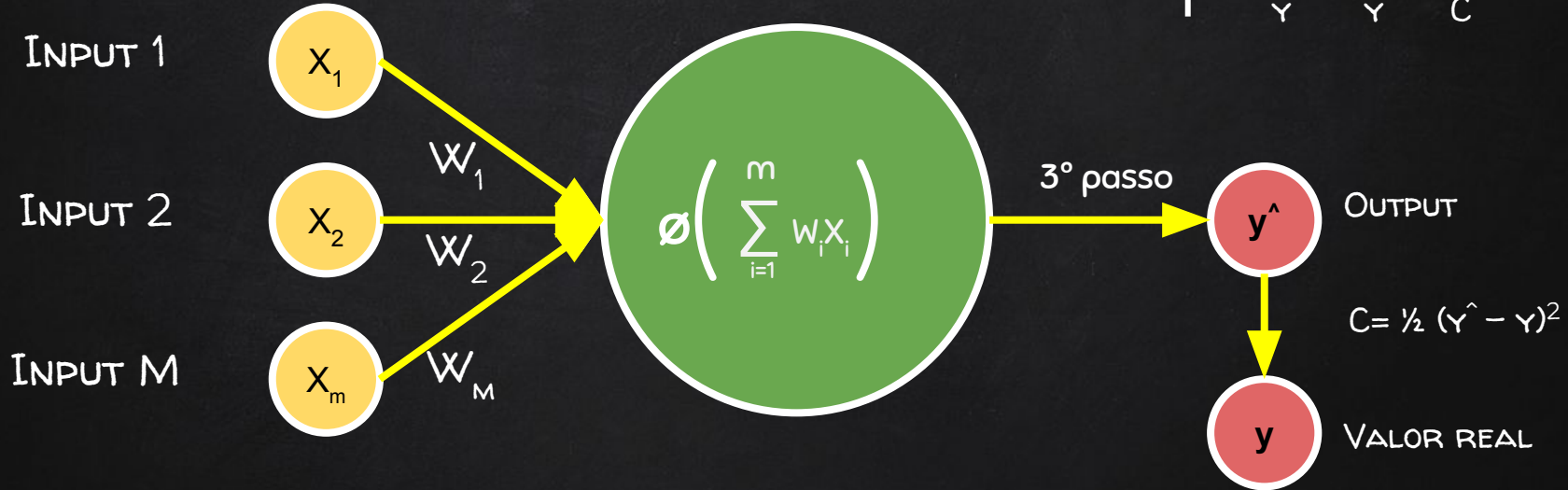
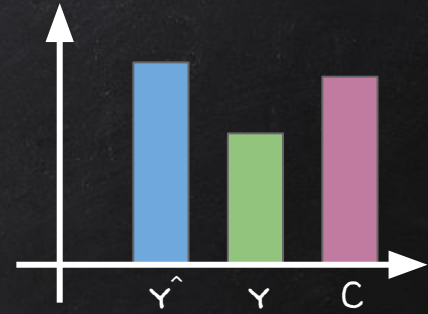
1. Intuição
 - Gradient Descent
 - Stochastic Gradient Descent
 - BackPropagation
2. Prática
 - Oficina de Github
 - Criar nossos Projetos



GRADIENT DESCENT

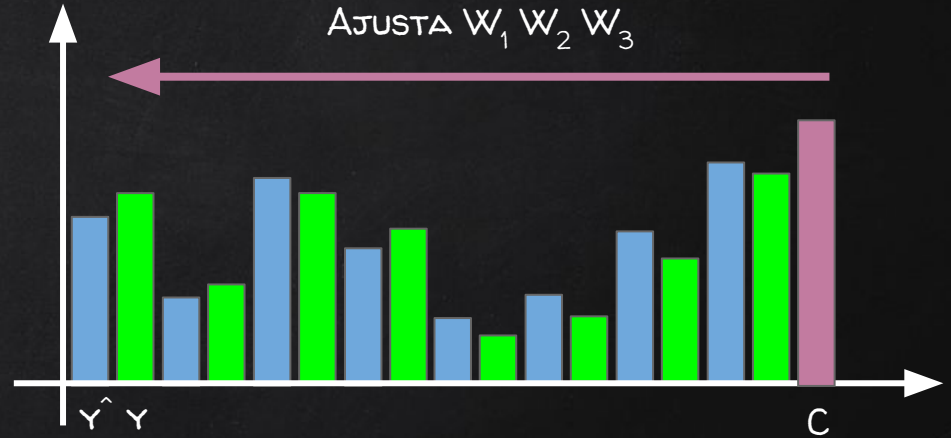
Calculando os pesos







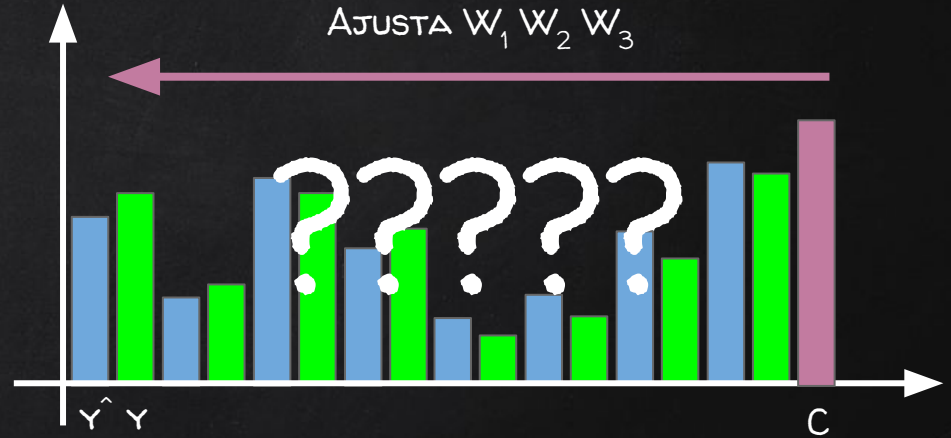
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$$C = \sum \frac{1}{2} (\hat{y} - y)^2$$



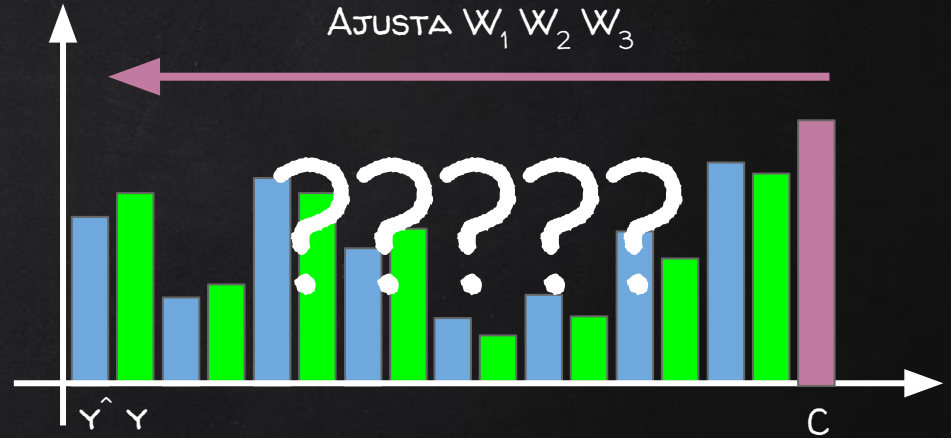
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$$C = \sum \frac{1}{2} (Y^{\wedge} - Y)^2$$



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$$C = \sum \frac{1}{2} (Y-hat - Y)^2$$

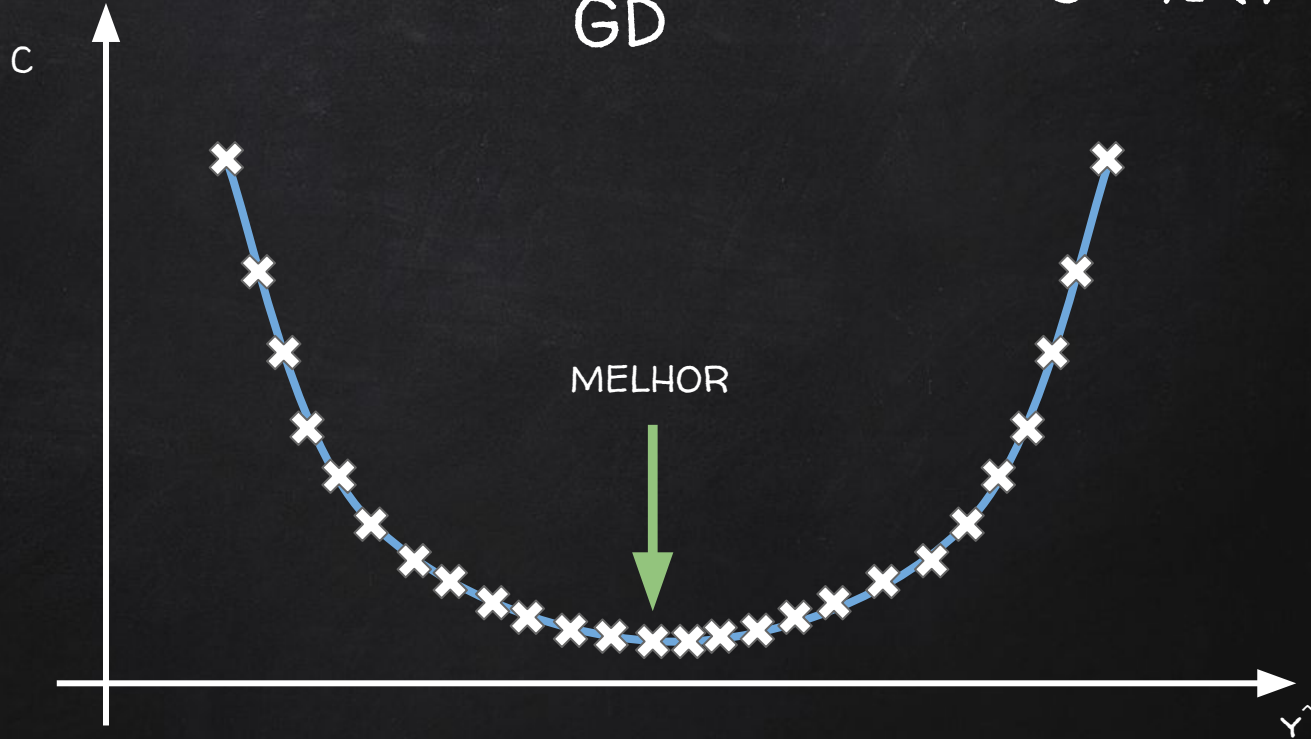


$$C = \frac{1}{2} (\hat{Y} - Y)^2$$





$$C = \frac{1}{2} (\hat{Y} - Y)^2$$





$$C = \frac{1}{2} (\hat{Y} - Y)^2$$





GD

QUARTOS

x_1

METROS²

x_2

IDADE

x_3

DISTÂNCIA

x_4



$1.000 \times 1.000 \times 1.000 \times \dots \times 1.000 = 1000^{25} = 10^{75}$ combinações

Em um supercomputador Sunway TaihuLight

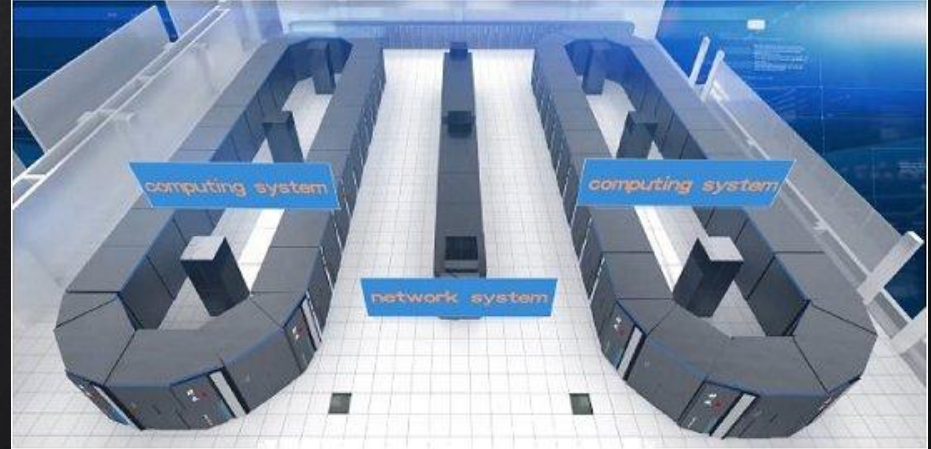
93 PFLOPS

93×10^{15}

$10^{75} / (93 \times 10^{15})$

$= 1,08 \times 10^{58}$ segundos

$= 3,42 \times 10^{50}$ anos



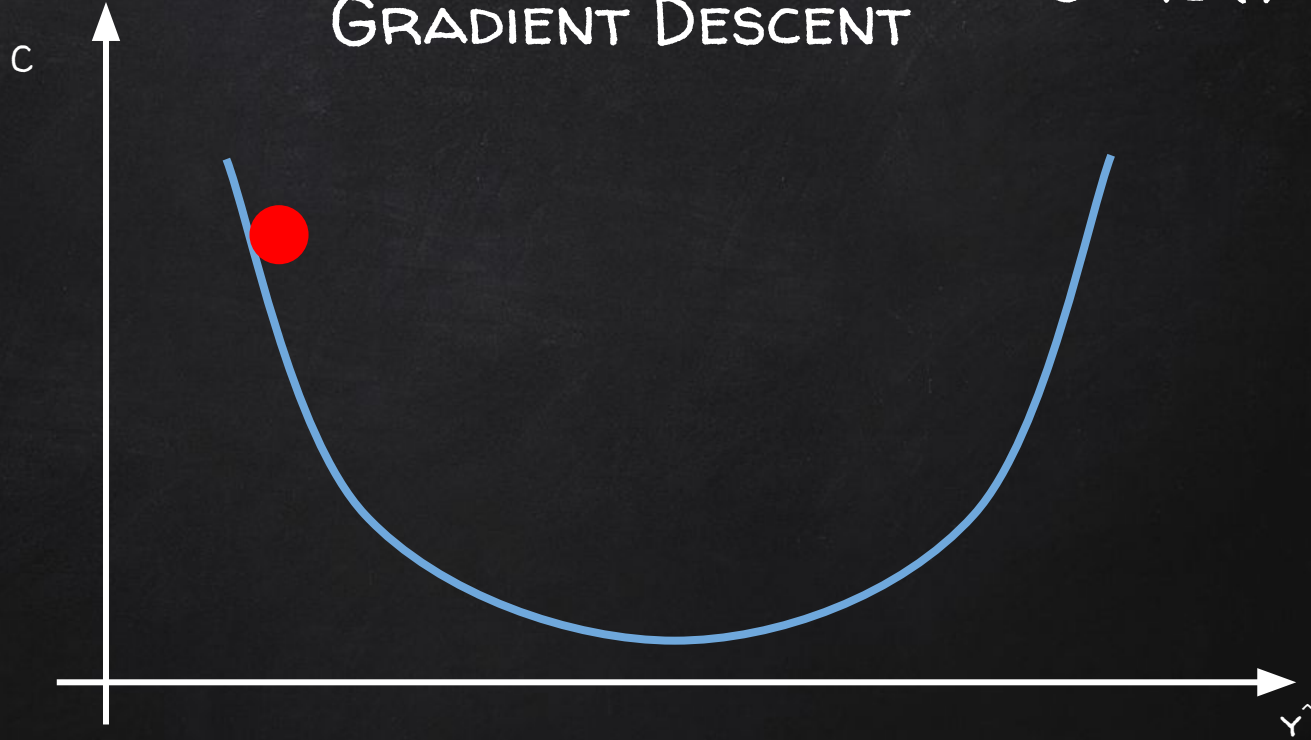
Muito tempo?





GRADIENT DESCENT

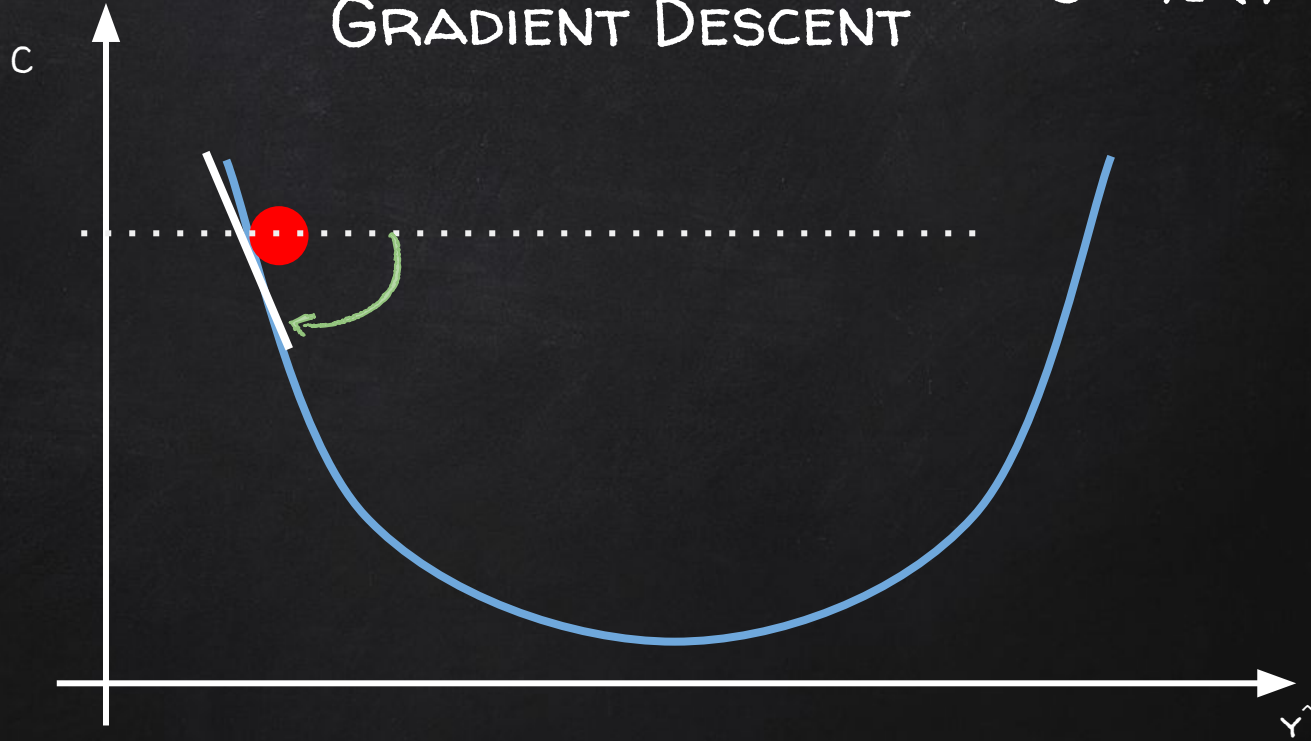
$$C = \frac{1}{2} (\hat{Y} - Y)^2$$





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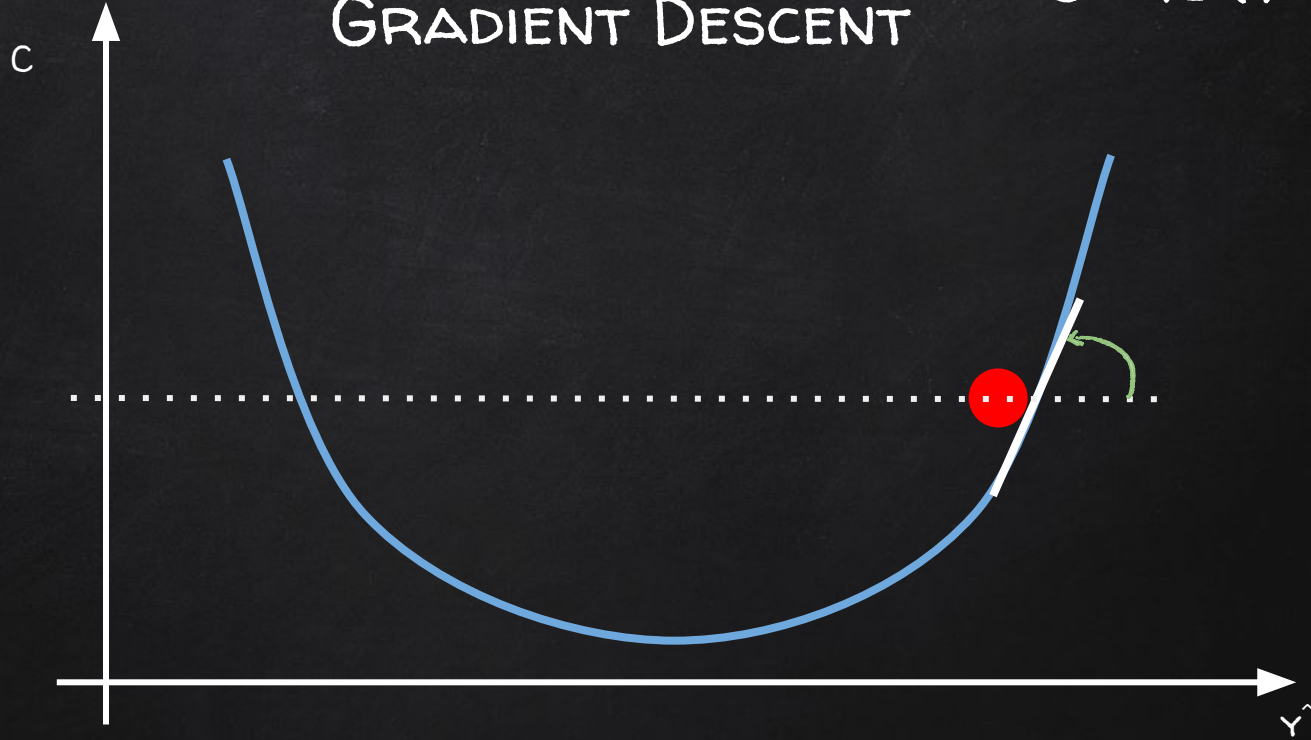
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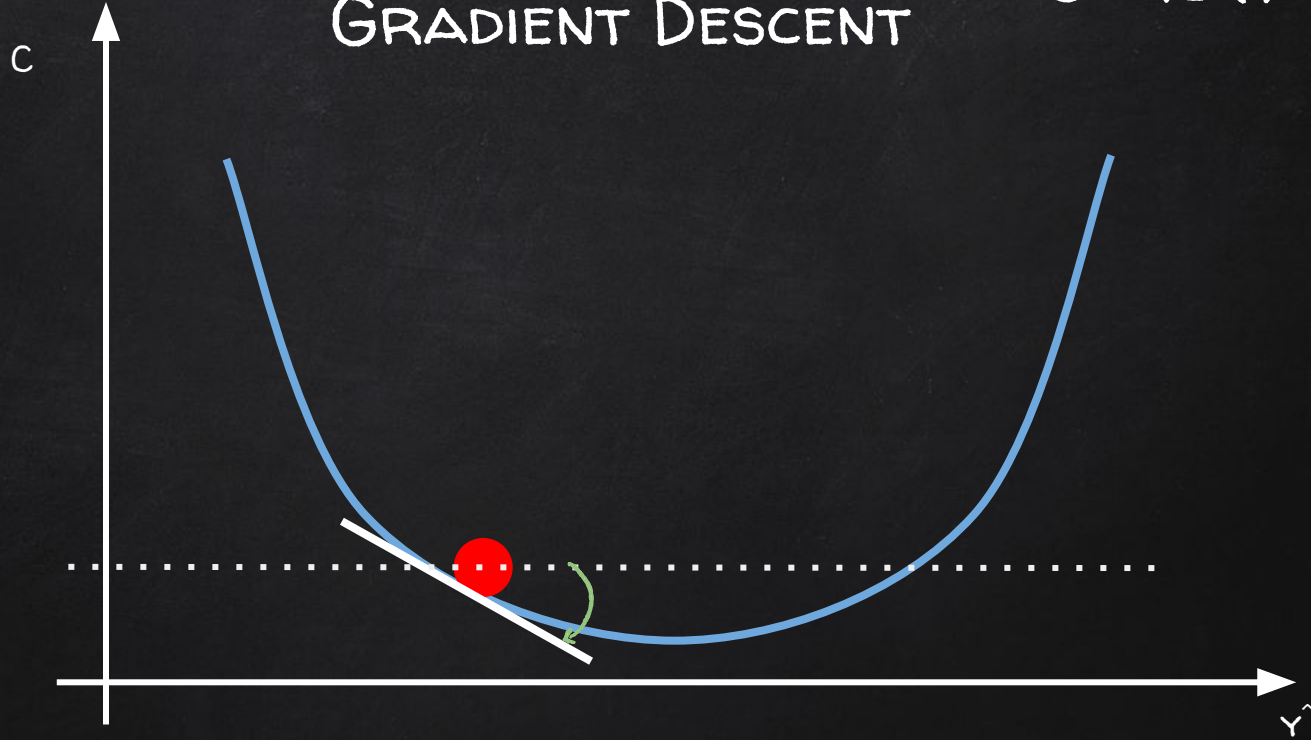
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GRADIENT DESCENT

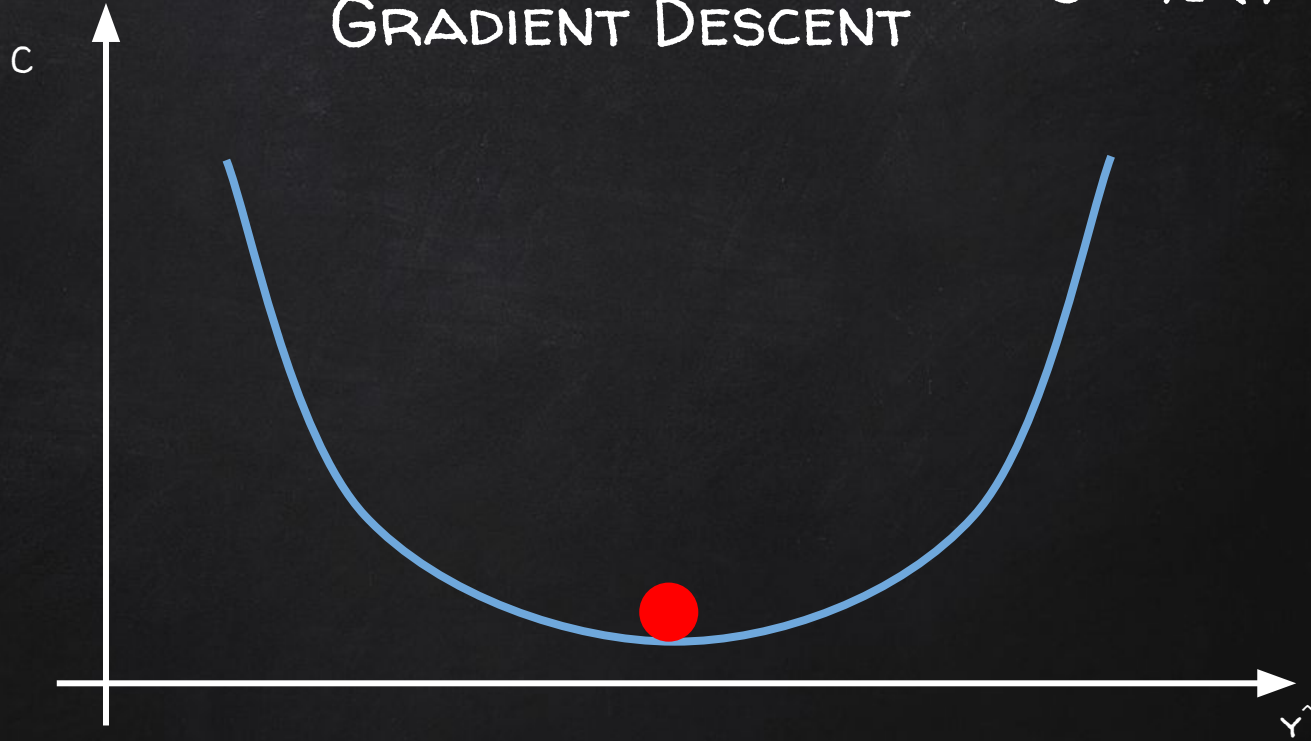
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GRADIENT DESCENT

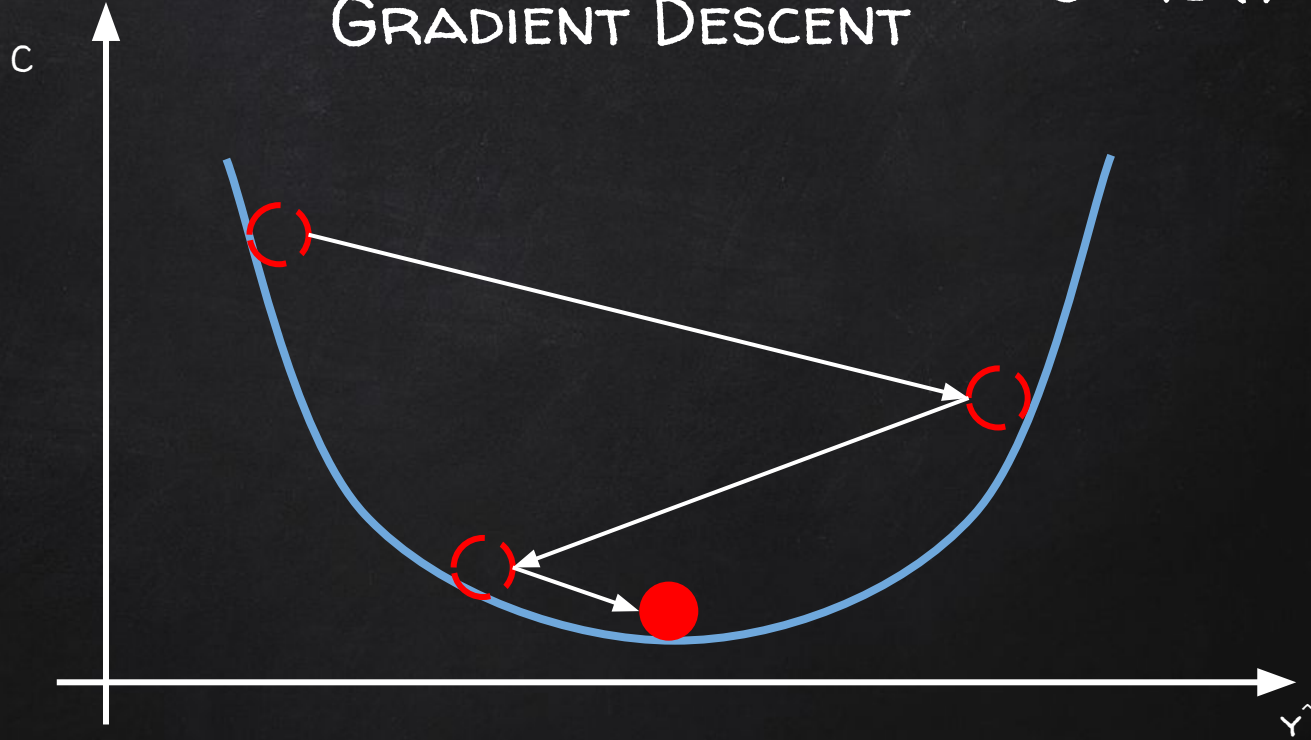
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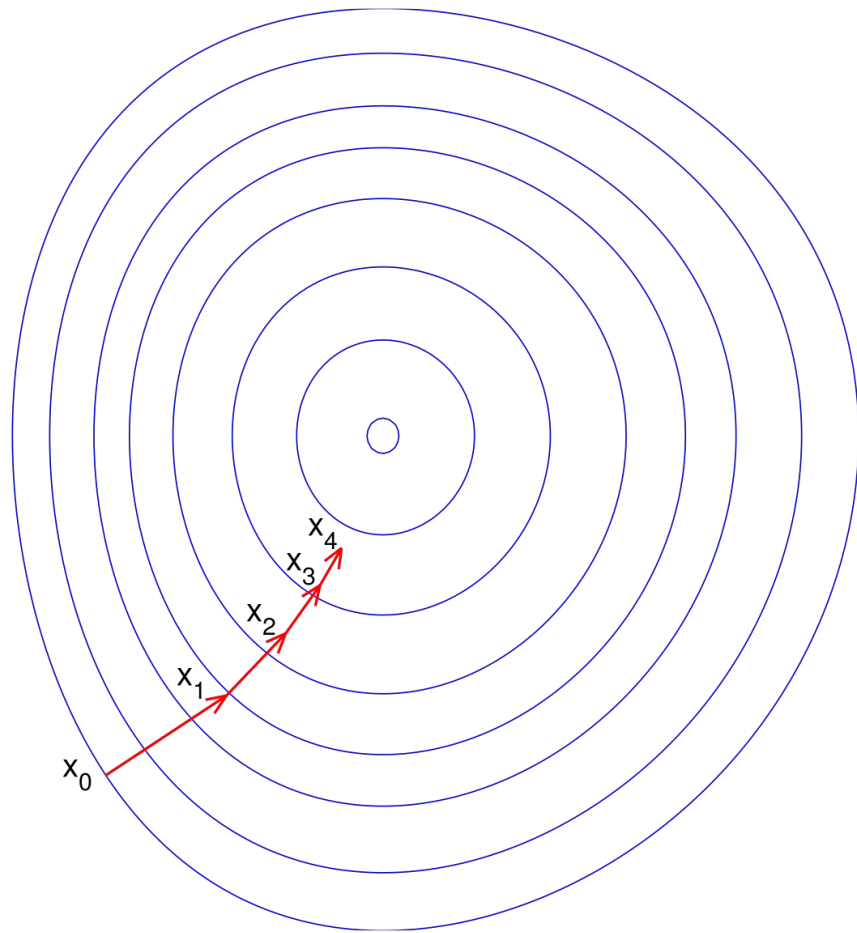


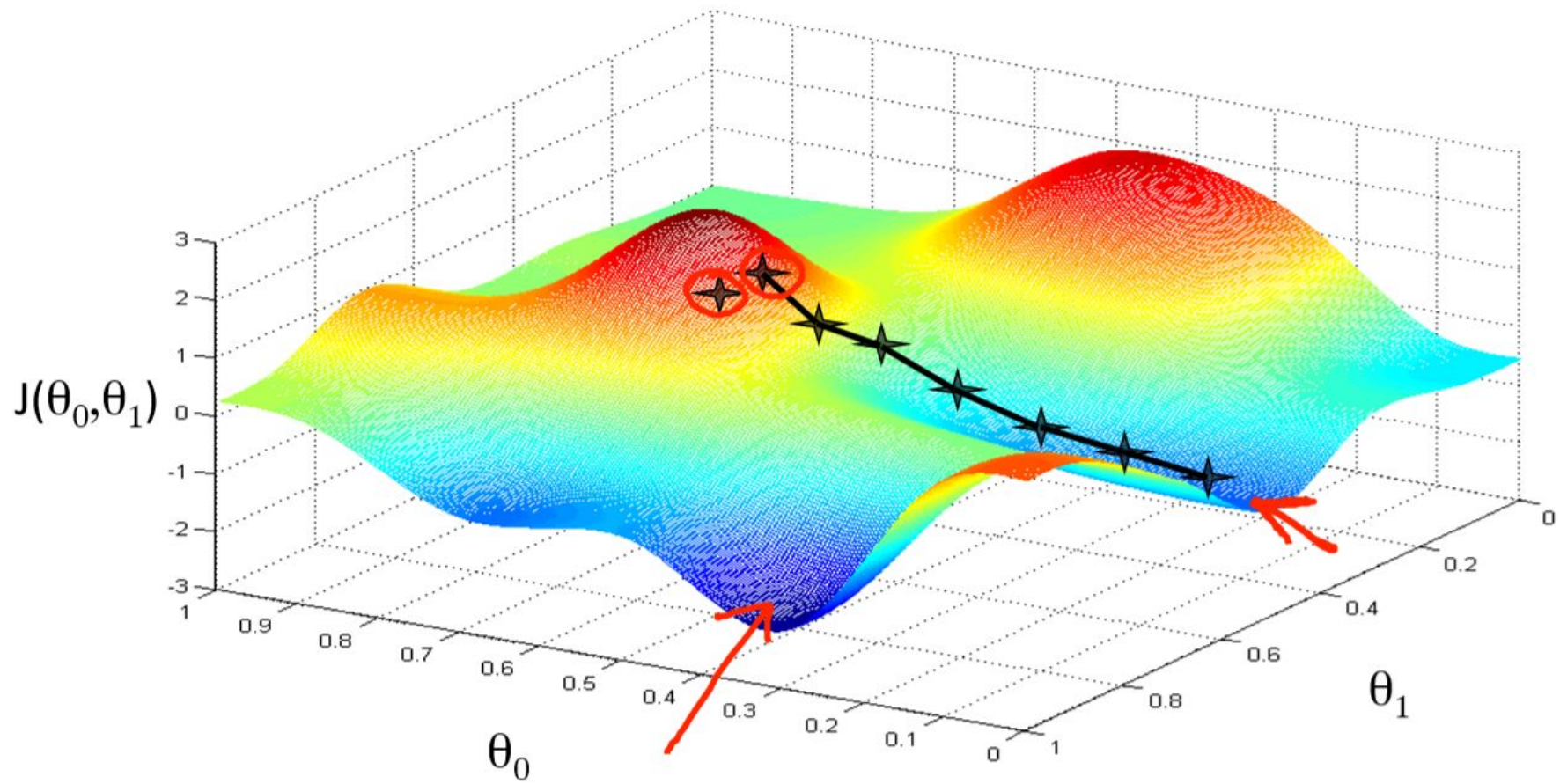


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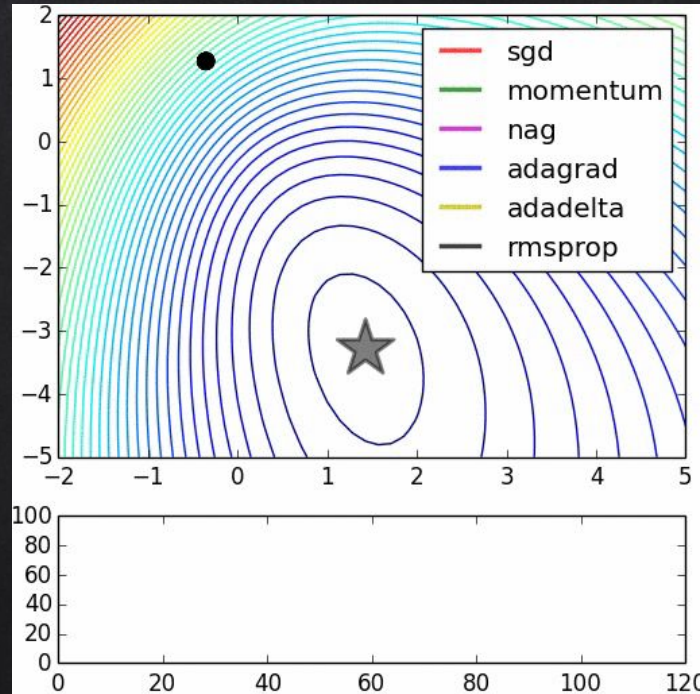






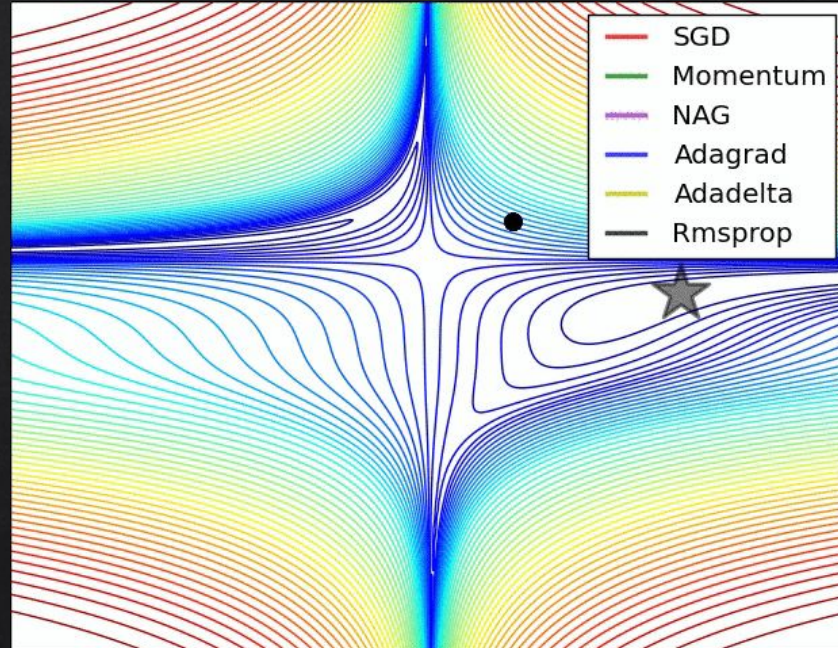


GRADIENT DESCENT





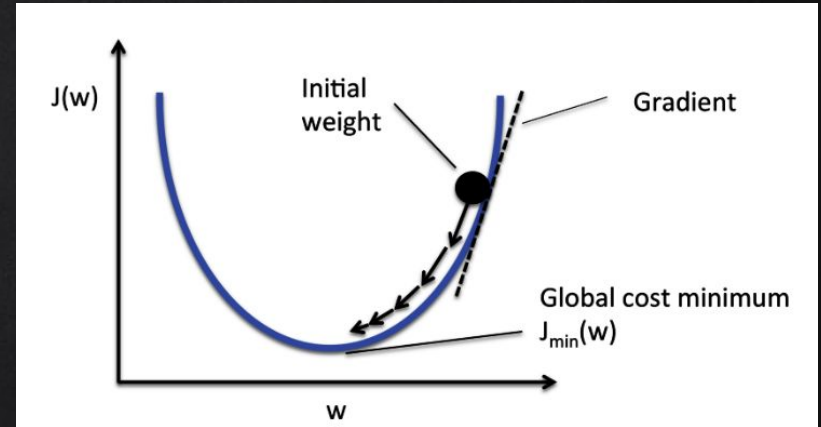
GRADIENT DESCENT





LEITURA ADICIONAL

Gradient Descent: All You Need to Know Suryansh S. (2018)



<https://medium.com/p/gradient-descent-aynk-7cbe95a778da>

<https://github.com/Frixoe/xor-neural-network/blob/master/XOR-Net-Notebook.ipynb>

Ficou fácil agora?



2.

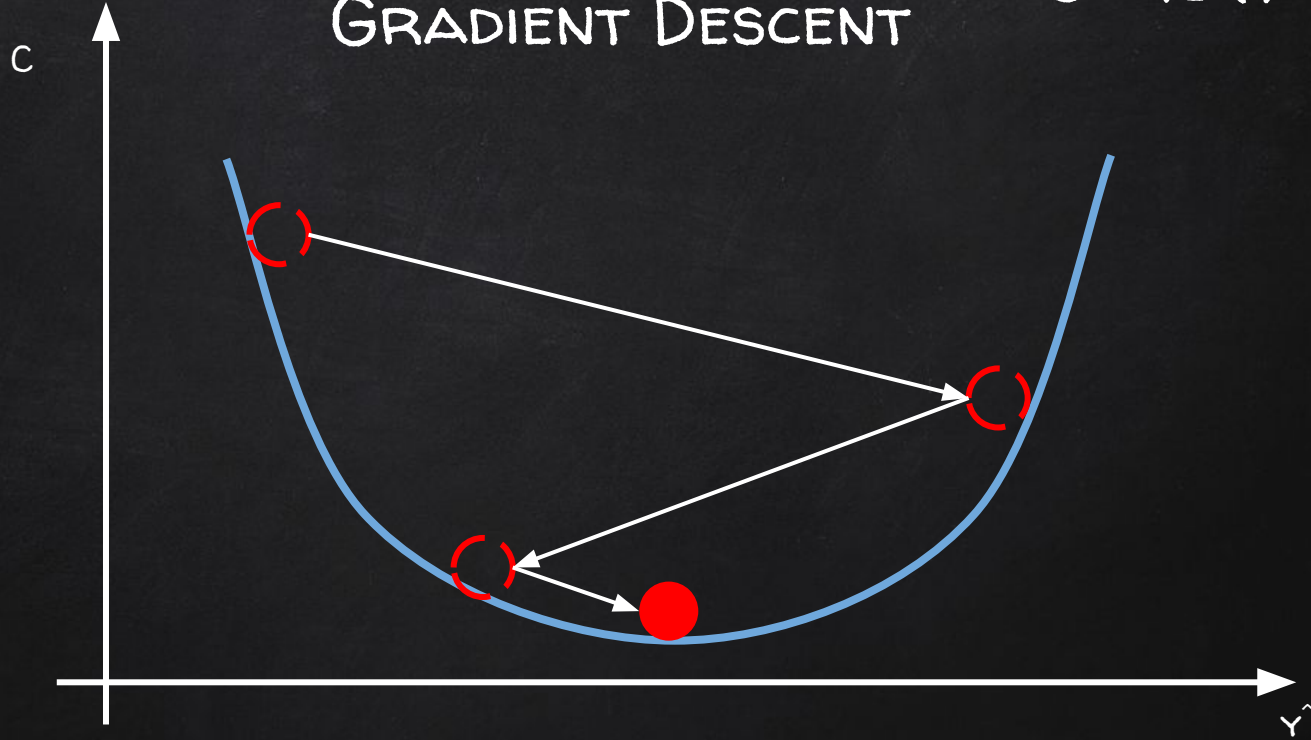
STOCHASTIC GRADIENT DESCENT

Engage!



GRADIENT DESCENT

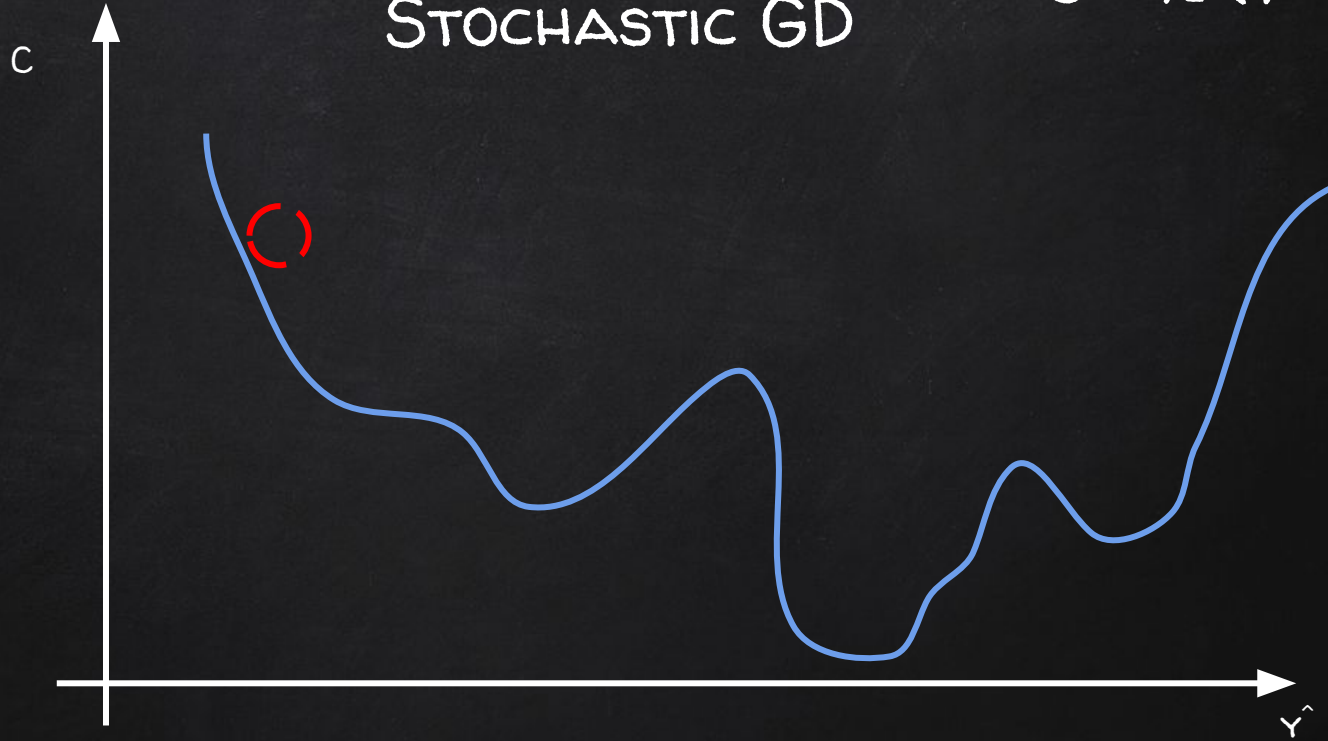
$$C = \frac{1}{2} (\hat{Y} - Y)^2$$





STOCHASTIC GD

$$C = \frac{1}{2} (\hat{Y} - Y)^2$$





STOCHASTIC GD

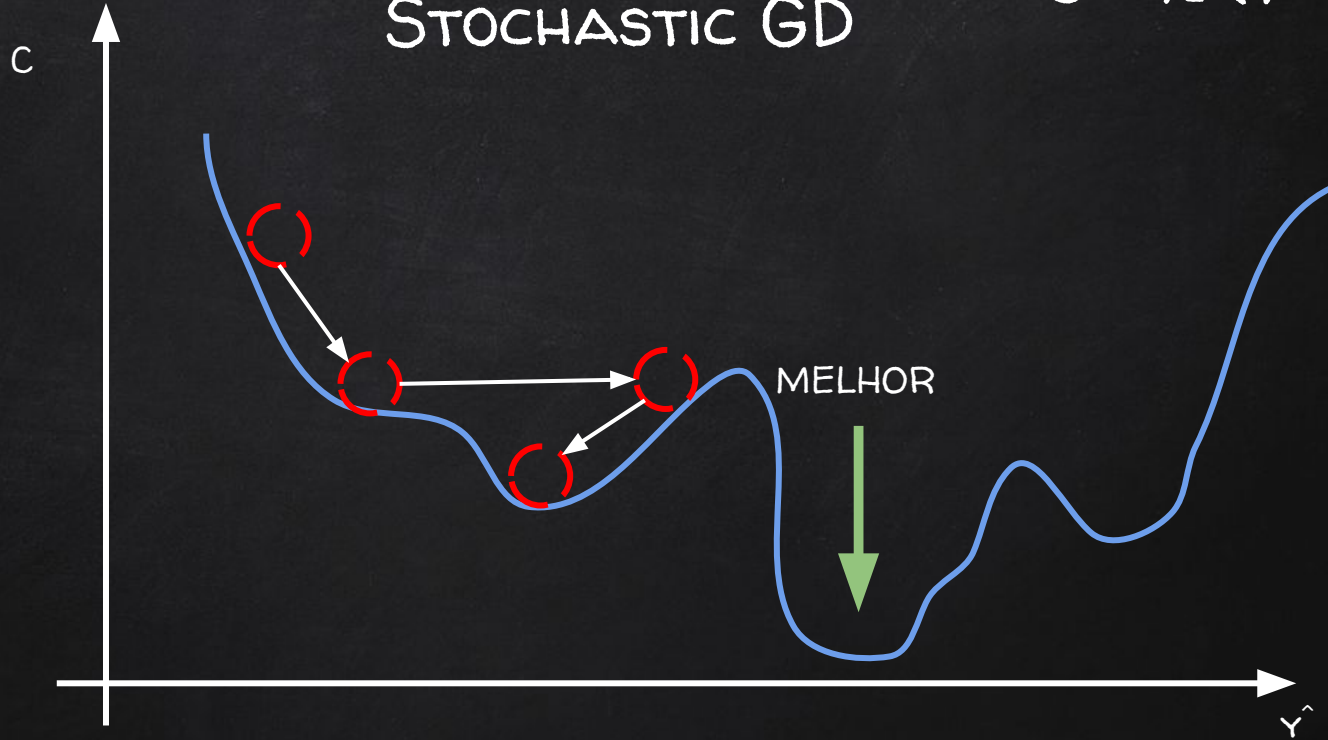
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STOCHASTIC GD

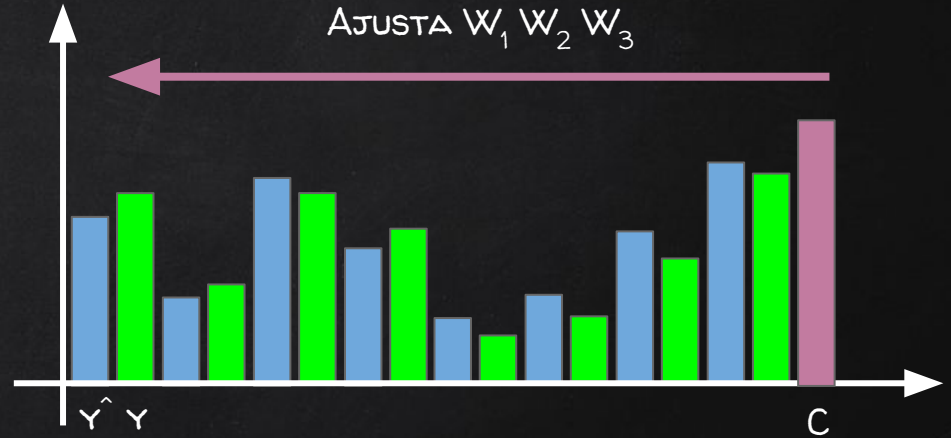
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BATCH GD

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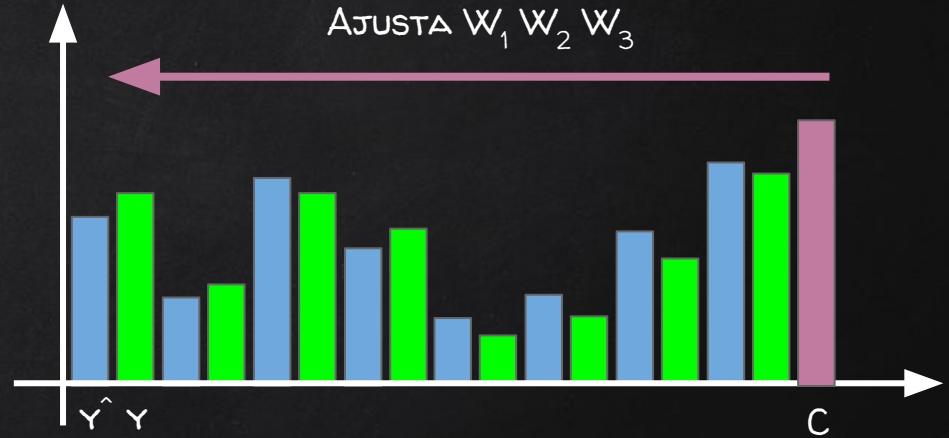


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STOCHASTIC GD

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BATCH
GRADIENT
DESCENT

STOCHASTIC
GRADIENT
DESCENT



STOCHASTIC GD

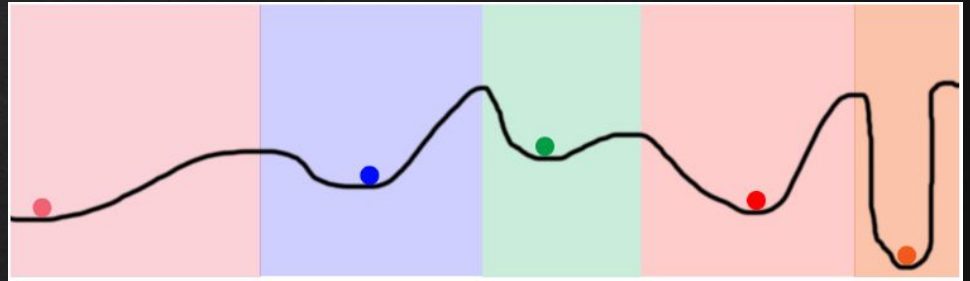
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MINI-BATCH GRADIENT DESCENT



LEITURA ADICIONAL

A Neural Network in
13 lines of Python
(Part 2 - Gradient Descent)
Andrew Trask (2015)



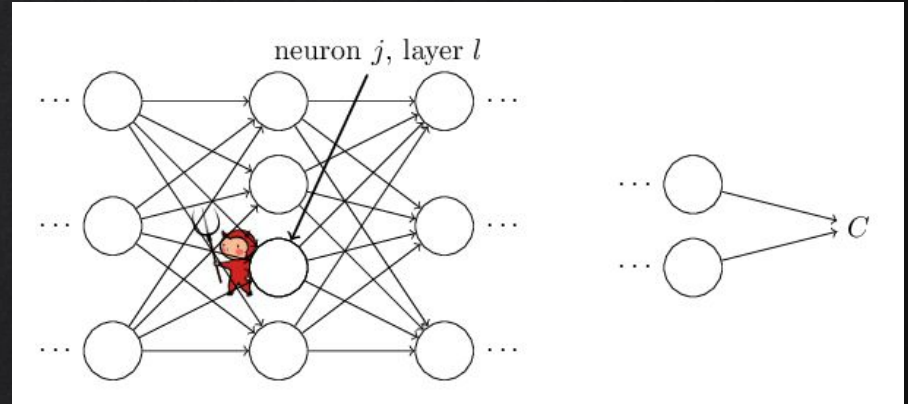
<http://iamtrask.github.io/2015/07/27/python-network-part2/>



APRENDIZAGEM

How the backpropagation algorithm works

Michael Nielsen (2015)



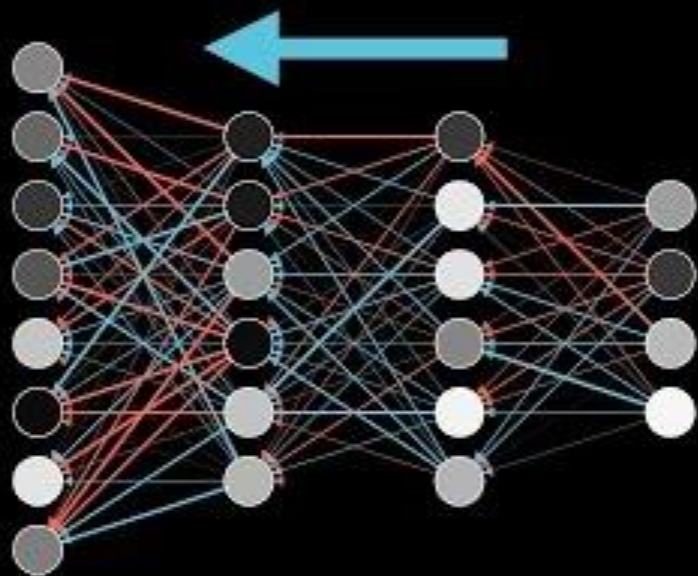
<http://neuralnetworksanddeeplearning.com/chap2.html>



BACKPROPAGATION

Ajustando os Pesos

Backpropagation





DEBATE

**Why AI is a threat to democracy
and what we can do to stop it**

<https://www.technologyreview.com/s/613010/why-ai-is-a-threat-to-democracyand-what-we-can-do-to-stop-it/>



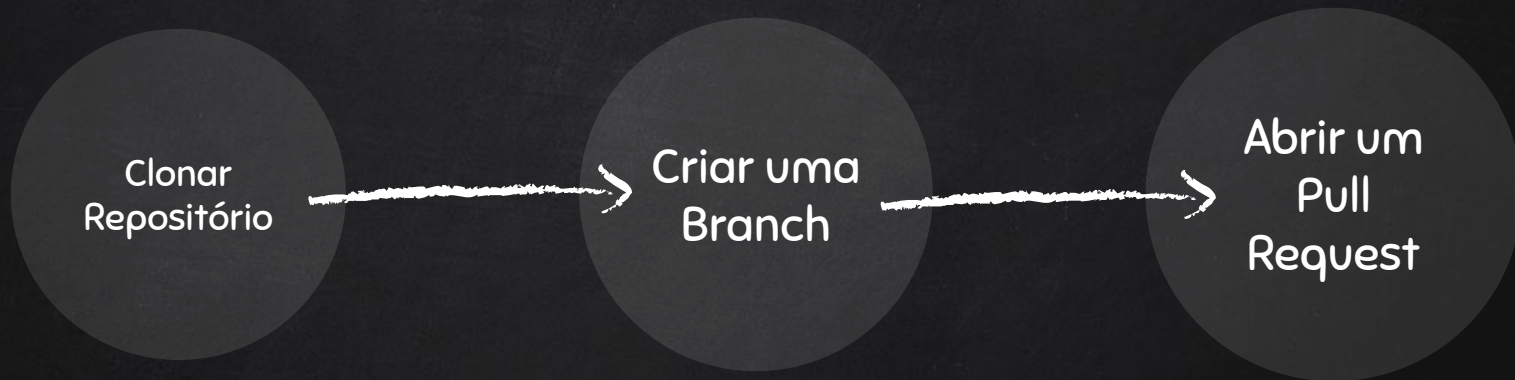
PRÁTICA

TUTORIAL DE GITHUB

Básico



COLABORANDO



<https://github.com/deeplearningunb/building-ann>

Vamos Exercitar?

```
54 # Adding the input layer and the first hidden layer
55 classifier.add(Dense(units = 6, kernel_initializer = 'uniform', activation = 'relu', input_dim = 11))
56
57 # Adding the second hidden layer
58 classifier.add(Dense(units = 6, kernel_initializer = 'uniform', activation = 'relu'))
59
60 # Adding the output layer
61 classifier.add(Dense(units = 1, kernel_initializer = 'uniform', activation = 'sigmoid'))
62
63 # Compiling the ANN
64 classifier.compile(optimizer = 'adam', loss = 'binary_crossentropy', metrics = ['accuracy'])
65
66 # Fitting the ANN to the Training set
67 classifier.fit(X_train, y_train, batch_size = 10, epochs = 100)
```

1. Crie uma branch com seu nome
 2. Troque a função de ativação
 3. Compile a rede
 4. Commit do resultado (NA SUA BRANCH)
-

Vamos Exercitar?





QUAL VAI SER
O SEU PROJETO?

Momento da Decisão



MÉTODO



<https://github.com/deeplearningunb/building-ann>



O QUE FAZER?

>> Ideia

1. Qual é o problema?
2. Qual solução você propõe?
3. Quem será Beneficiado com essa solução?

>> Equipe

1. Quais são os talentos que sua equipe precisa ter?
2. Quem será o líder dessa equipe?
3. Quais serão as regras de conduta?
4. Quantas pessoas terá sua equipe?

>> Planejamento

1. Objetivos
2. Metas
3. Tarefas
4. Recursos necessários
5. Riscos
6. Cronograma
7. Membros/Stakeholders



COMO FAZER?

>> Github

1. Batize seu projeto
2. Crie um repositório
3. Inicie o README.md
4. Crie seus Milestones e Labels
5. Crie seu Projeto usando Kanban
6. Comece a Criar Issues
7. Assinale as issues a um membro da sua equipe

Preparados?





OBRIGADO!

Dúvidas?

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<https://t.me/DeepLearningUnB>
@diegodorgam

CREDITS

Special thanks to all the people who made and released these awesome resources for free:

- ✕ Presentation template by SlidesCarnival
- ✕ Photographs by Unsplash