

Otimização de Técnica de **Localização** Baseada em RF Fingerprint



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Problema

RF Fingerprint é uma forma de identificar a localização de um aparelho móvel através de uma “impressão digital”, única, que caracteriza sua transmissão de sinal. Interferências, como o desvanecimento por multipercurso, fazem com que cada transmissão tenha valores distintos de tempo e força de transmissão.



Problema

O problema abordado busca determinar a localização de um aparelho móvel relacionando os sinais coletados nas transmissões.

O objetivo do trabalho proposto é aplicar e avaliar técnicas de otimização sobre um método de aprendizagem de máquina para RF Fingerprint a partir da diferença entre a localização esperada e a localização real dos dispositivos.



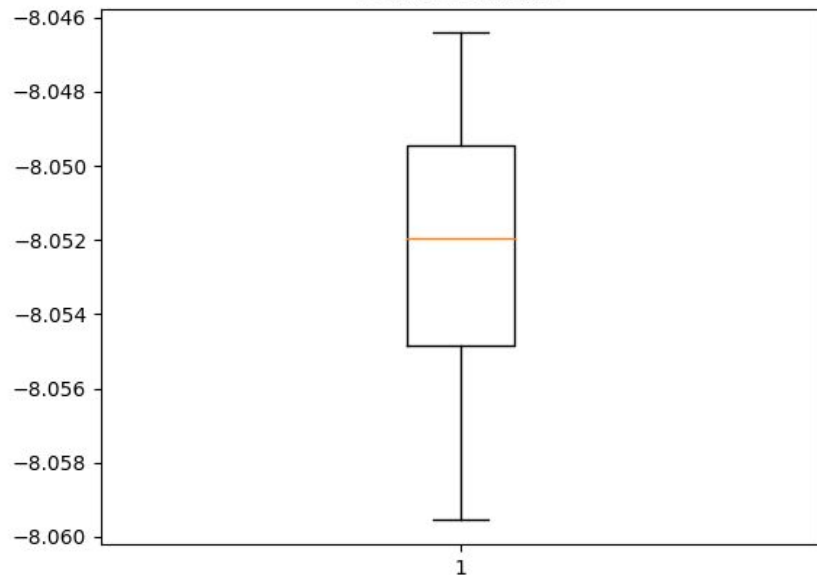
Ferramentas

- Scikit-learn (Aprendizagem de Máquina em Python)
- Gradient Boost Framework (XGBoost)
- PyTorch (Aprendizagem de Máquina em Python)
- Matplotlib (Visualização de Dados e Plots)

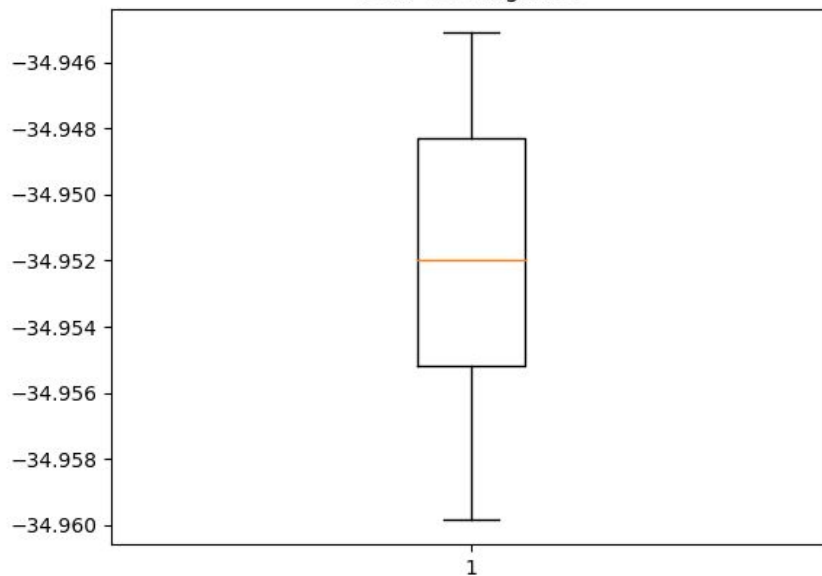


Análise dos Dados

BoxPlot Latitude



BoxPlot Longitude





Solução Proposta

- Naive Drop “outliers”
- Gradient Boost
- Multi Layer Perceptron



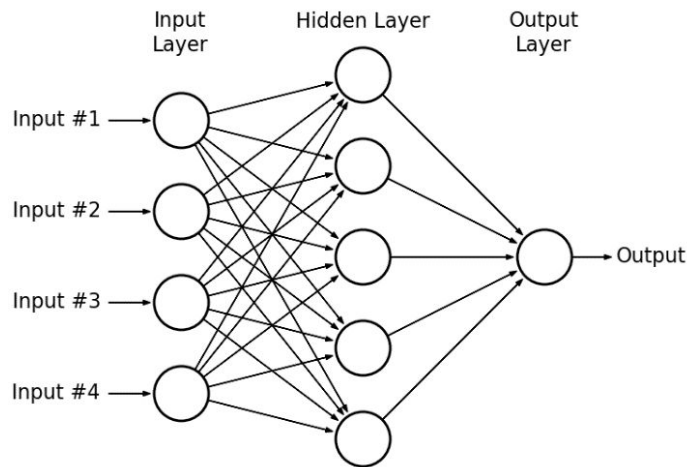
eXtreme Gradient Boosting

- Baseado em árvores com aumento de gradiente.
- Combina um grupo de estimativas de um conjunto de modelos mais simples e mais fracos.



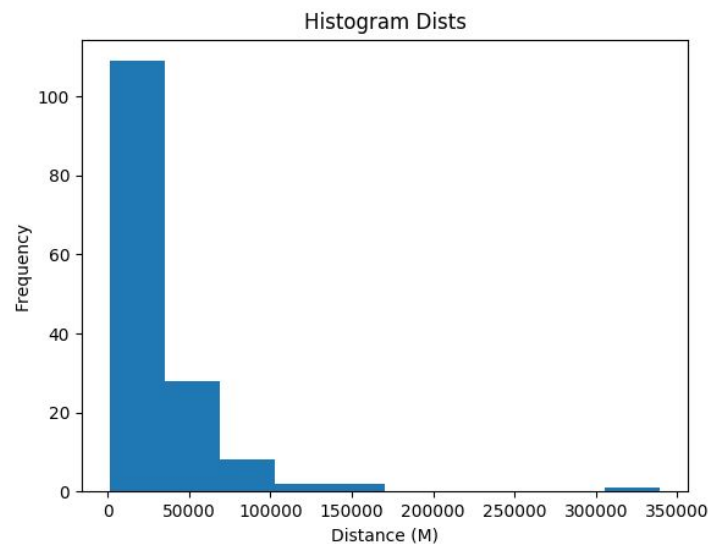
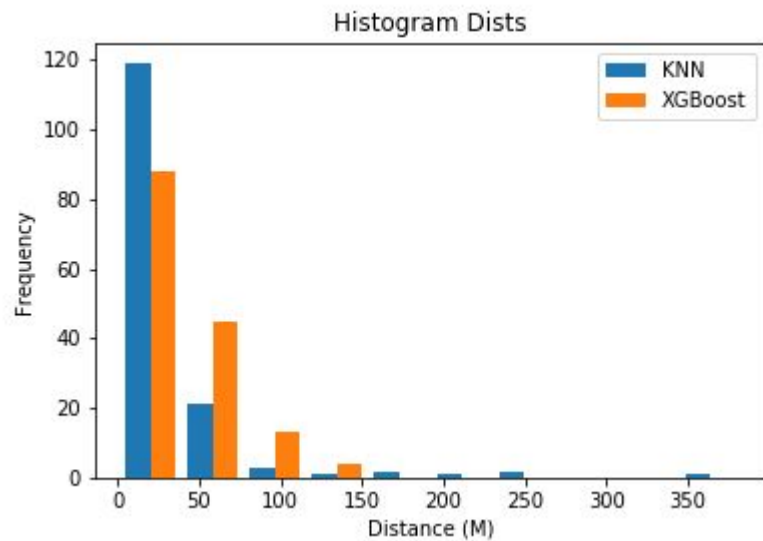
Multi Layer Perceptron

- Feed Forward NN
- BackPropagation



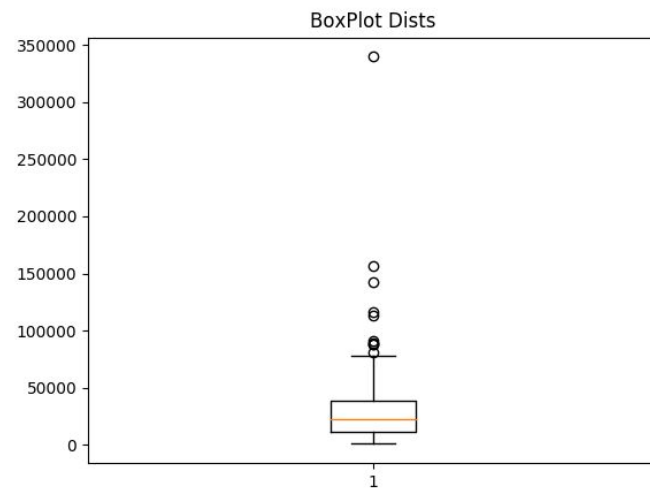
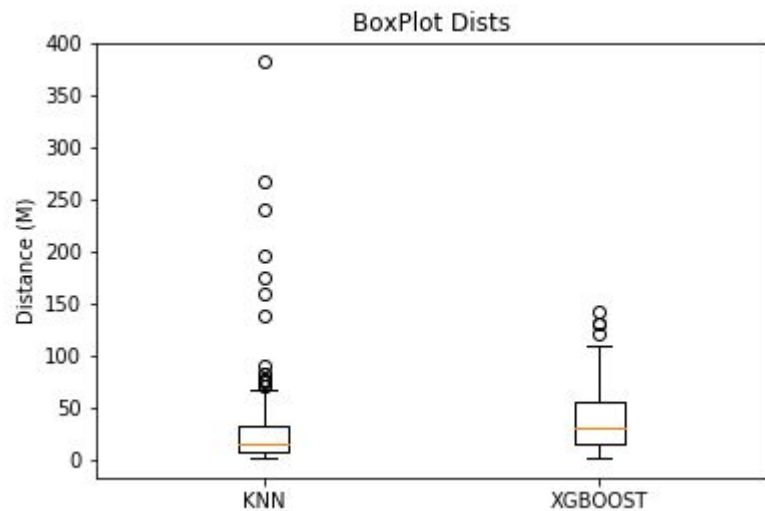


Resultados



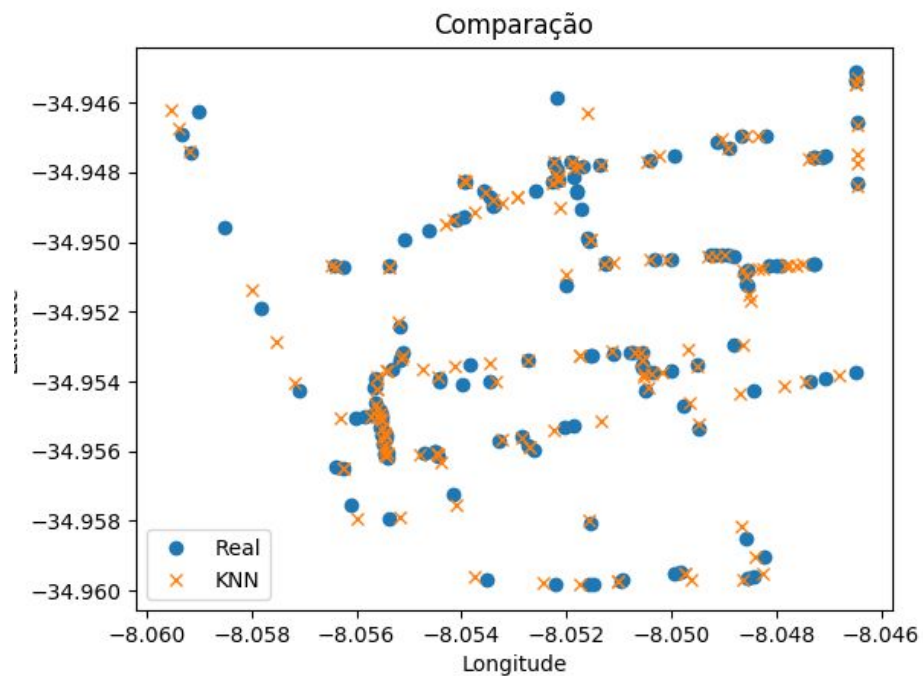


Resultados



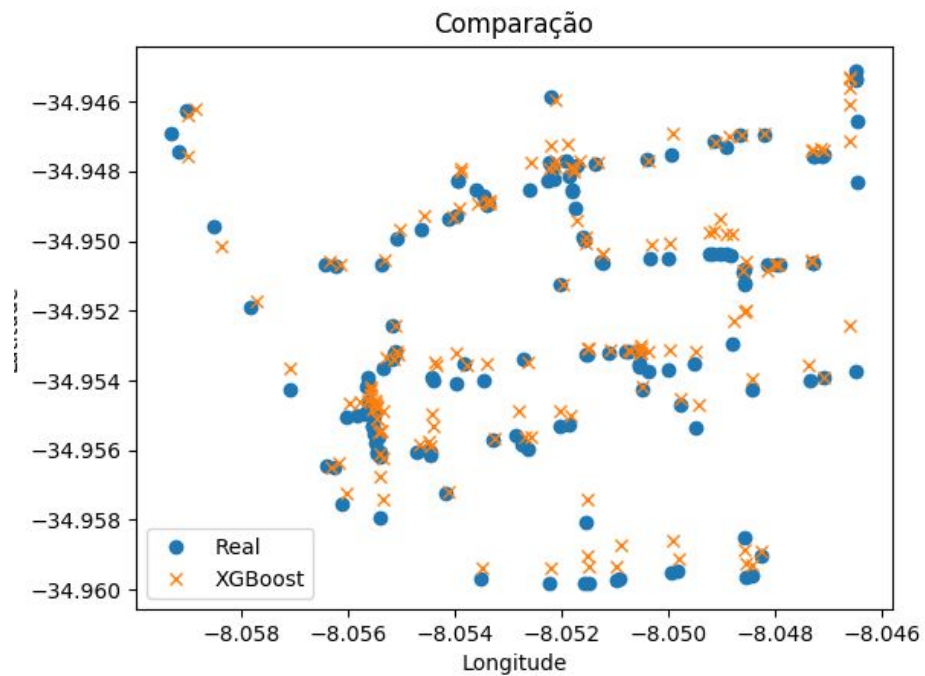


Resultados



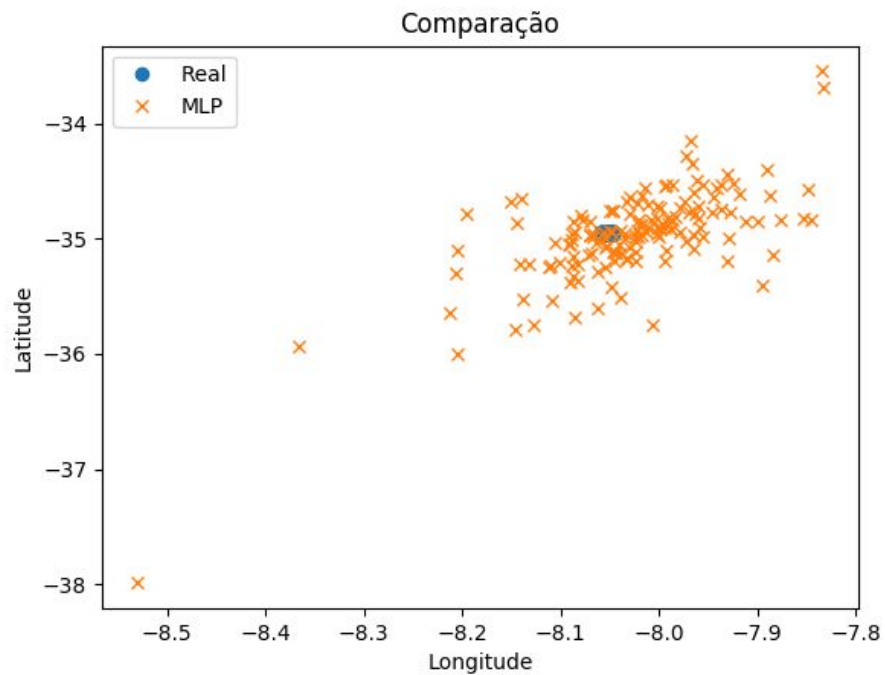


Resultados





Resultados





Resultados

	KNN	XGBOOST	MLP
Erro Médio	31.15	38.39	31381.67
Erro Mínimo	1.10	2.13	1094.54
Erro Máximo	382.62	142.99	339531.08
Desvio Padrão	49.76	30.48	36713.02



Conclusão

Dentre as análises feitas, o KNN se mostrou o regressor mais acurado para as localizações, porém o XGBoost apresenta uma confiança maior de um melhor resultado. Não Conseguimos conduzir bons experimentos com MLP.



Dificuldades

- Quantidade de Dados
 - Overfitting
 - Dados não fidedignos
- Encontrar parâmetros
- Encontrar arquitetura



Instructions for use

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I am here because I love to give presentations.

You can find me at @username

1

Transition headline

Let's start with the first set of slides

Quotations are commonly printed
as a means of inspiration and to
invoke philosophical thoughts
from the reader.



“



This is a **slide title**

- Here you have a list of items
- And some text
- But remember not to overload your slides with content

Your audience will listen to you or read the content, but won't do both.



Big concept

Bring the attention of your audience over a key concept using icons or illustrations



You can also split your content

White

Is the color of milk and fresh snow, the color produced by the combination of all the colors of the visible spectrum.

Black

Is the color of coal, ebony, and of outer space. It is the darkest color, the result of the absence of or complete absorption of light.



In two or three columns

Yellow

Is the color of gold, butter and ripe lemons. In the spectrum of visible light, yellow is found between green and orange.

Blue

Is the colour of the clear sky and the deep sea. It is located between violet and green on the optical spectrum.

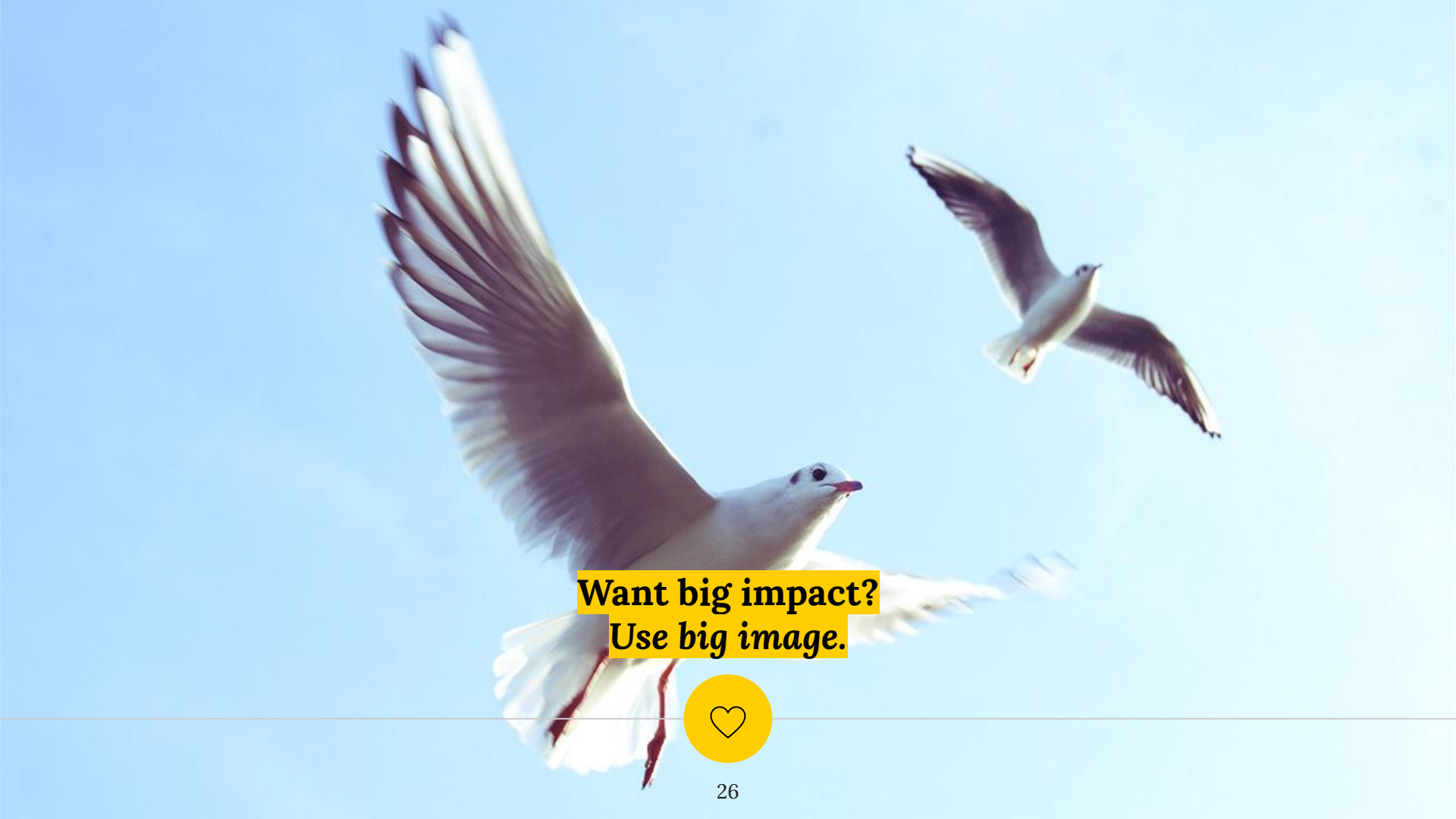
Red

Is the color of blood, and because of this it has historically been associated with sacrifice, danger and courage.



A picture is worth **a thousand words**

A complex idea can be conveyed with just a single still image, namely making it possible to absorb large amounts of data quickly.

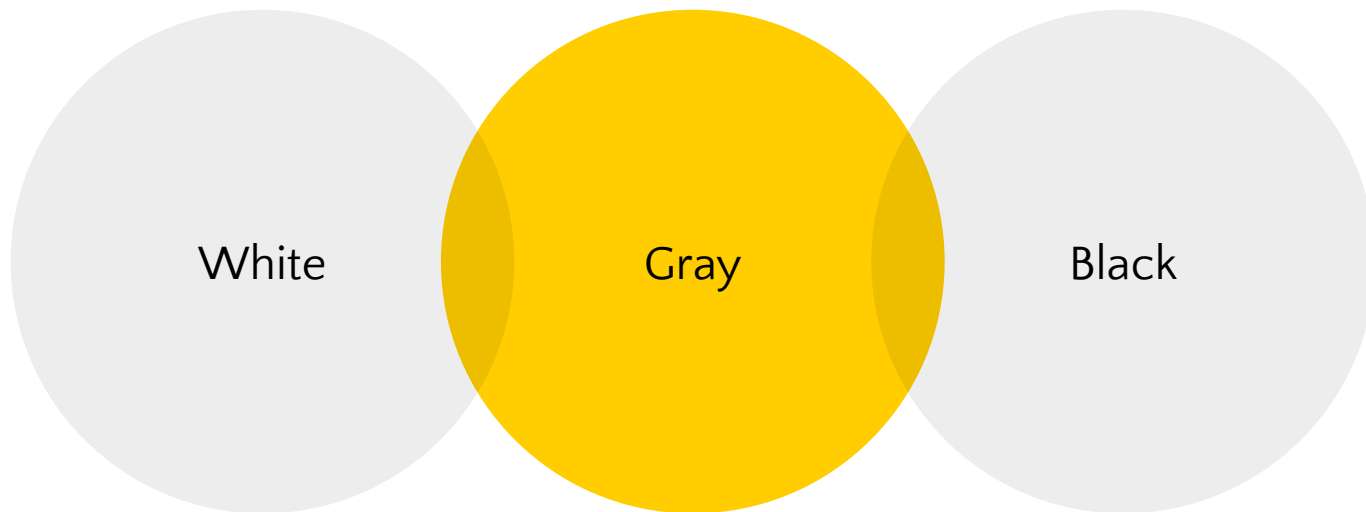


**Want big impact?
Use *big image*.**



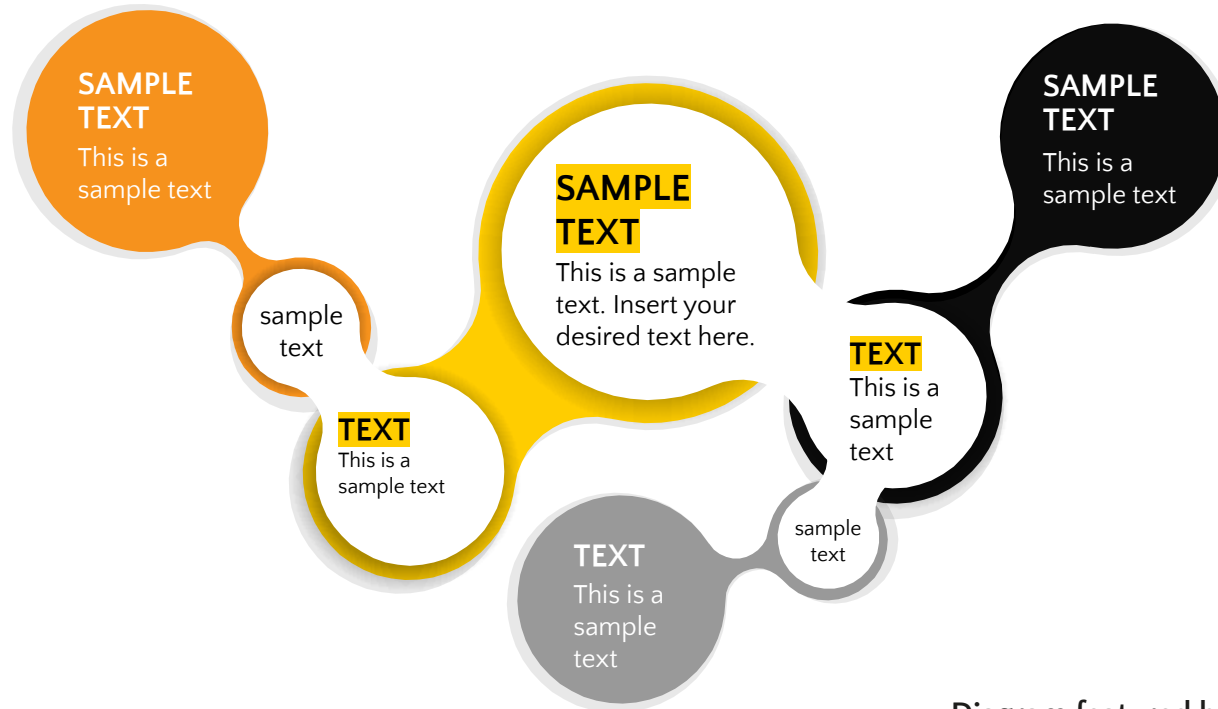


Use charts to explain your ideas





Or use **diagrams** to explain complex ideas





And tables to **compare data**

	A	B	C
Yellow	10	20	7
Blue	30	15	10
Orange	5	24	16



our
office

Maps



89,526,124

Whoa! That's a big number, aren't you proud?



89,526,124\$

That's a lot of money

185,244 users

And a lot of users

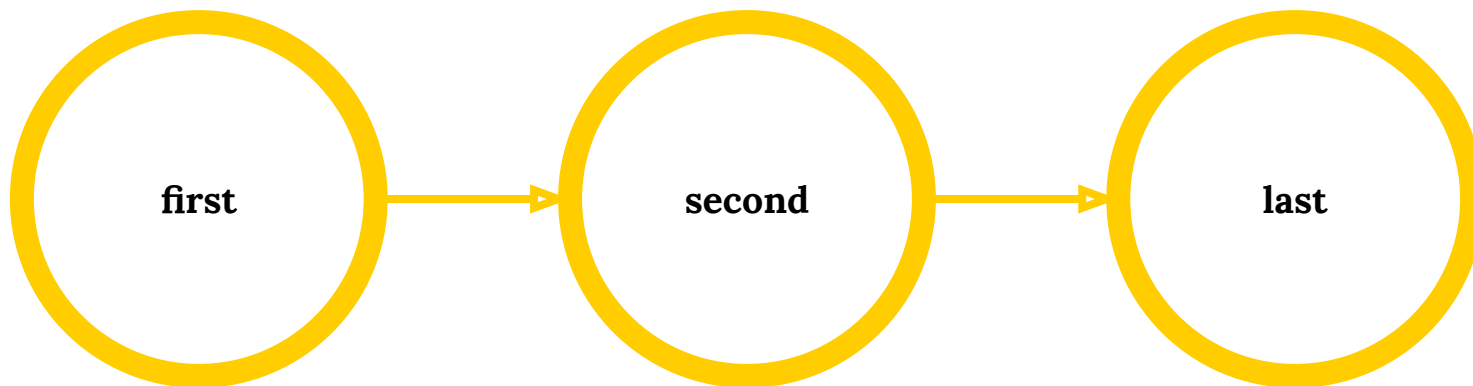
100%

Total success!





Our process is easy





Let's review some concepts

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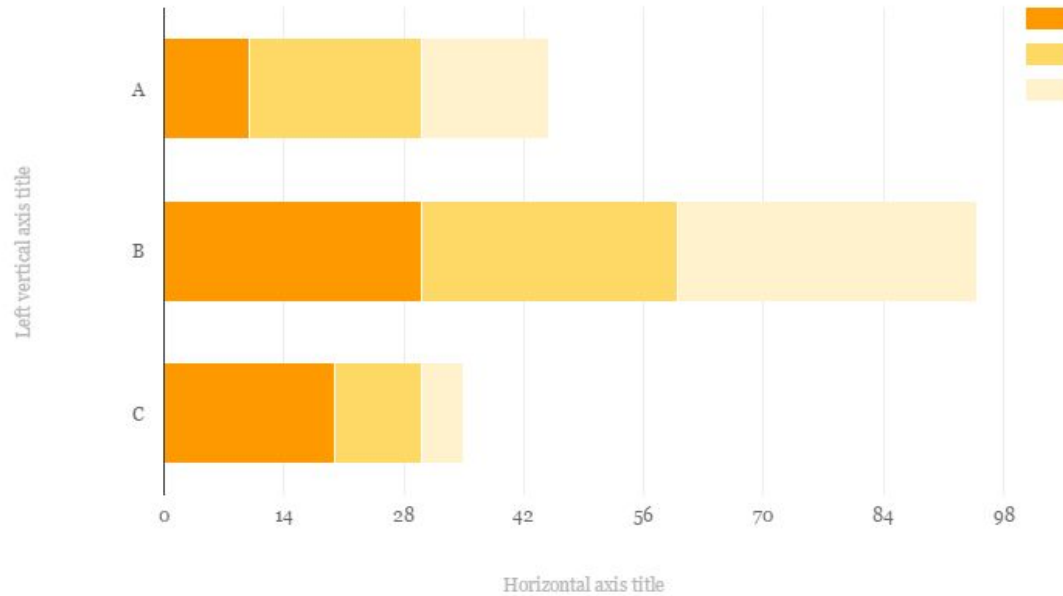
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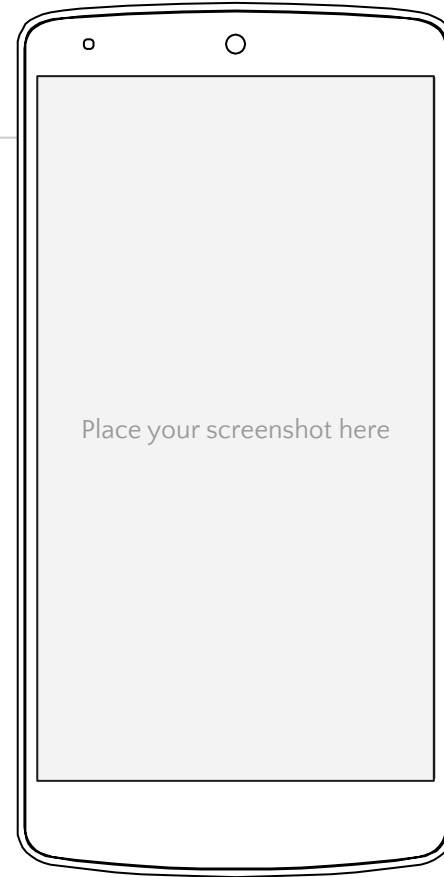
You can copy&paste graphs from Google Sheets





Android project

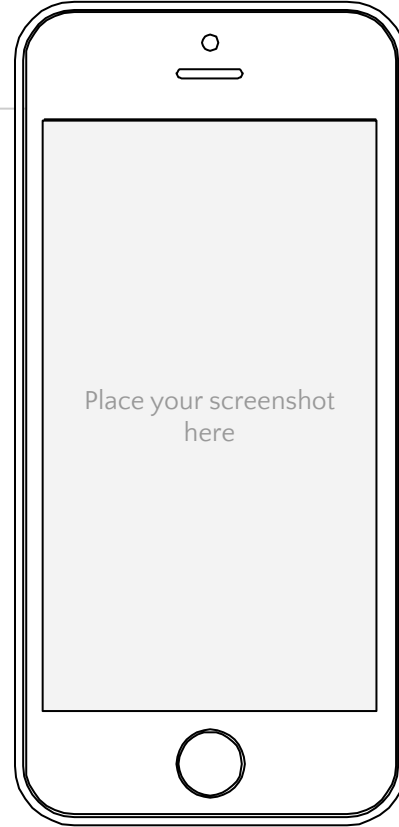
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iPhone project

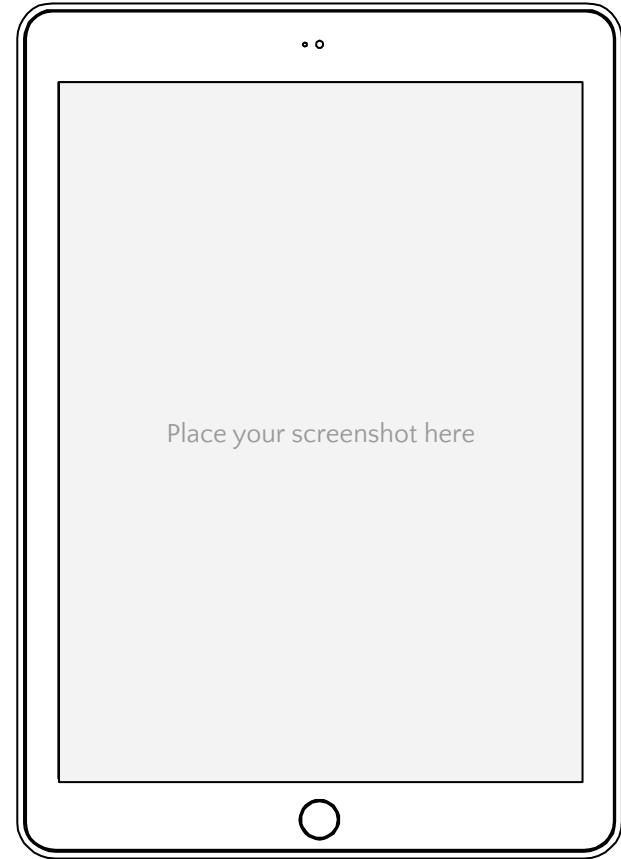
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Tablet project

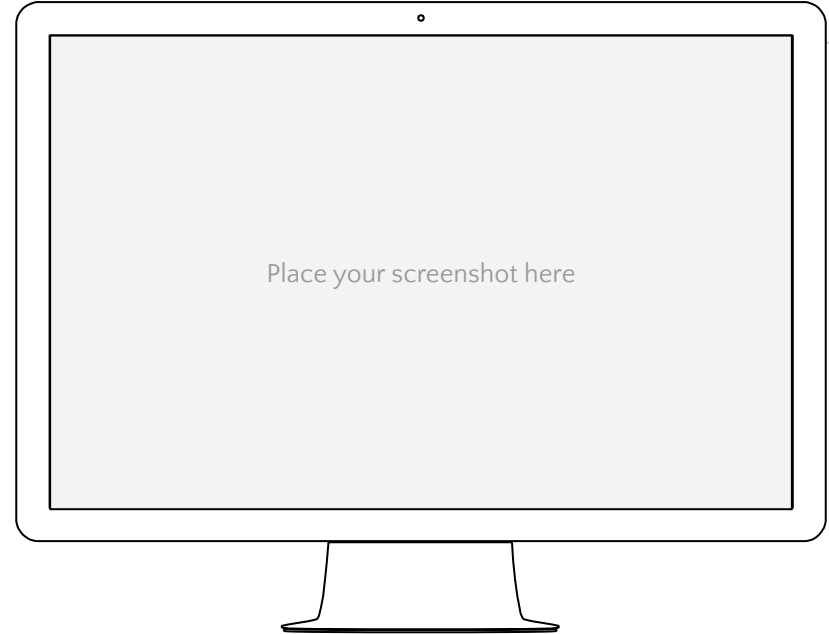
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Desktop project

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Thanks!

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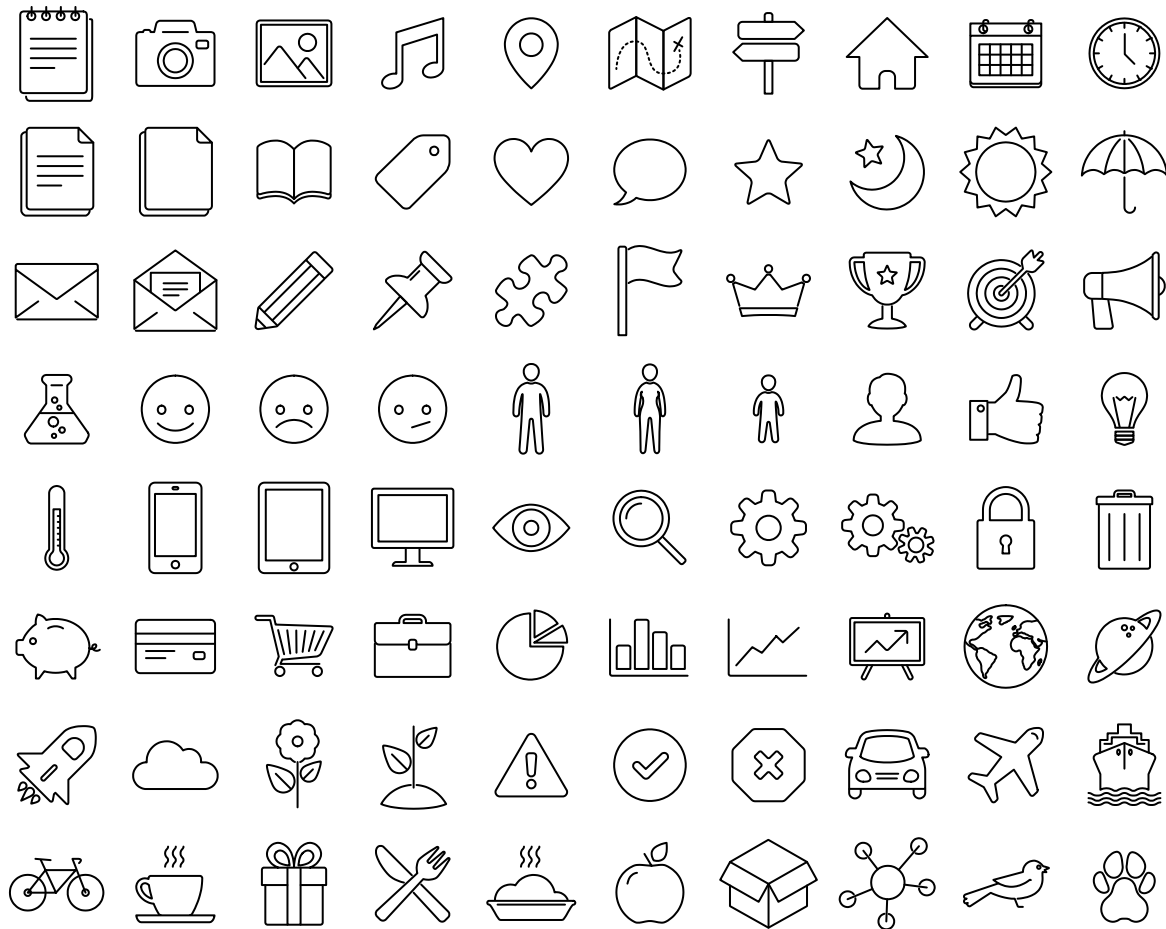
- Titles: **Lora**
- Body copy: **Quattrocento Sans**

You can download the fonts on these pages:

<https://www.fontsquirrel.com/fonts/lora>

<https://www.fontsquirrel.com/fonts/quattrocento-sans>

Yellow **#ffcd00** | Black **#000000** | Grey **#cccccc**



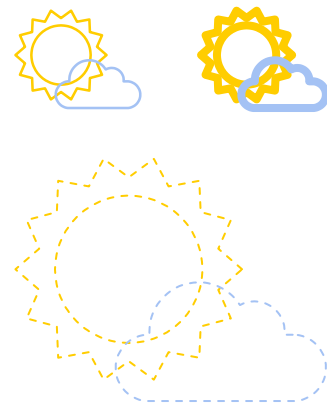
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- Change line color, width and style.

Isn't that nice? :)

Examples:



Now you can use any emoji as an icon!

And of course it resizes without losing quality and you can change the color.

How? Follow Google instructions

<https://twitter.com/googledocs/status/730087240156643328>



and many more...