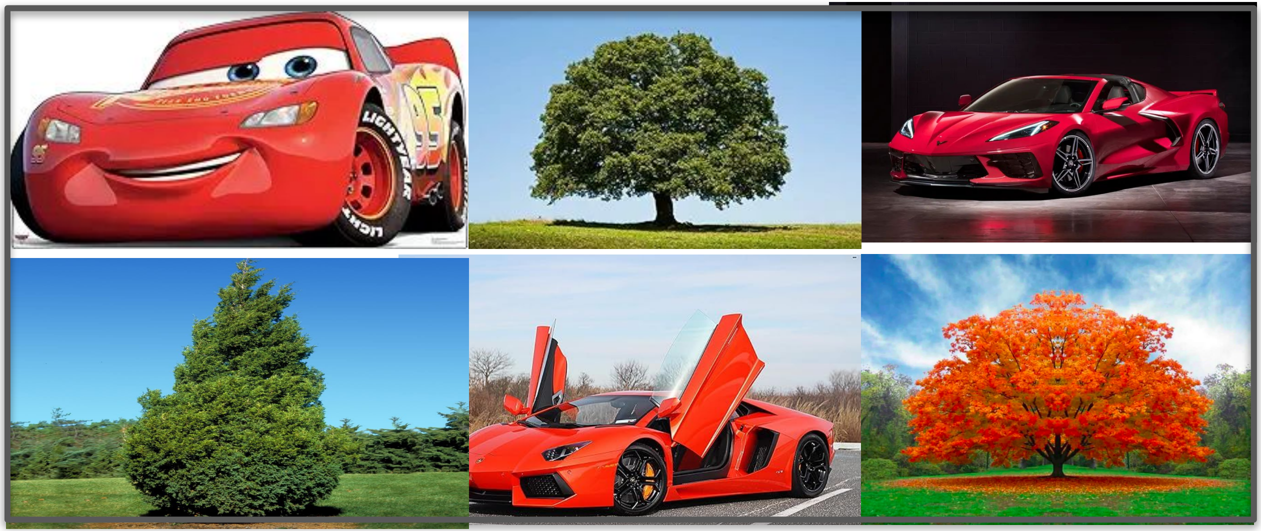
Machine Learning by Examples

Marcus Botacin

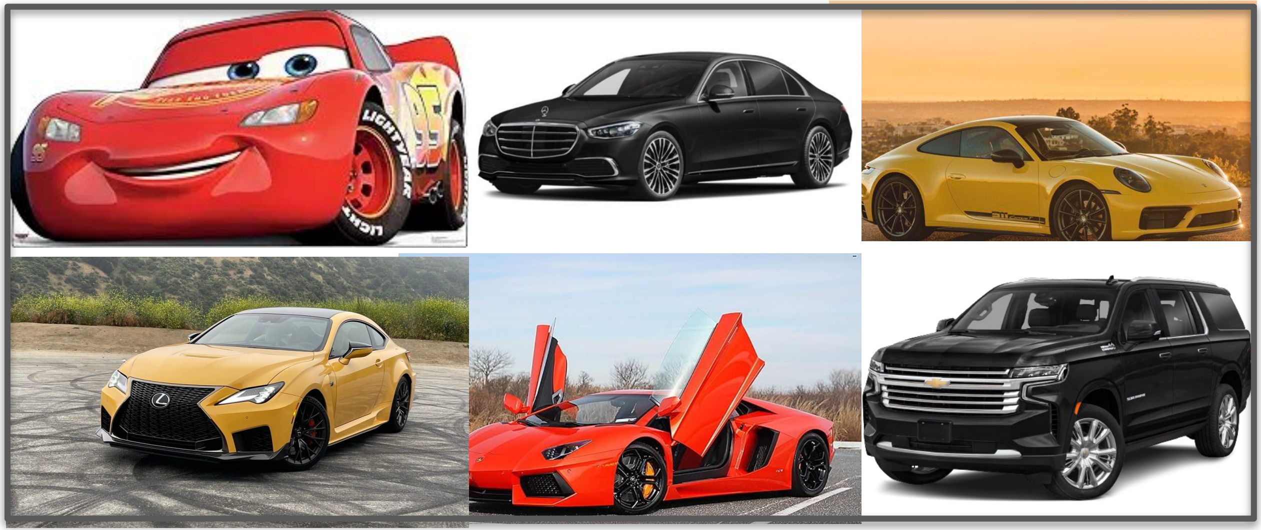
Machine Learning Tasks

Separate in groups



Classification

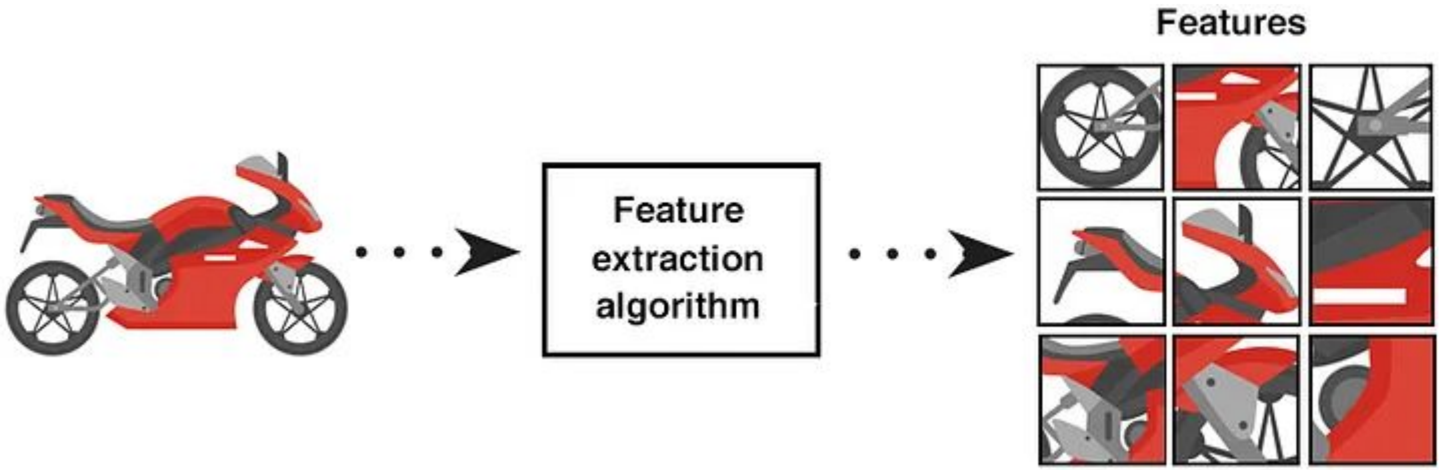
Separate in groups



Clustering

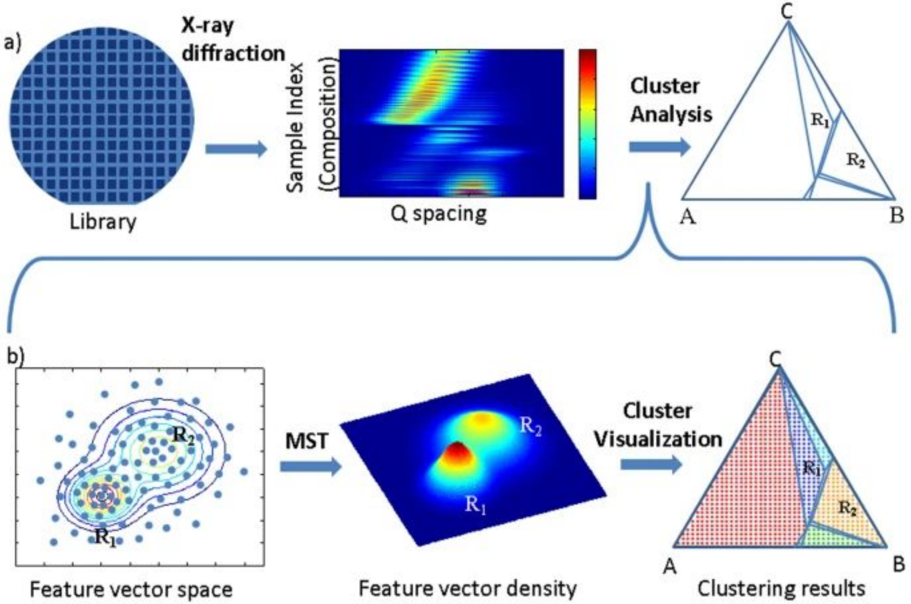
ML Features

ML: Feature Extraction and Representation



Source:
https://manningbooks.medium.com/the-computer-vision-pipeline-part-4-feature-extraction-6343ef063588

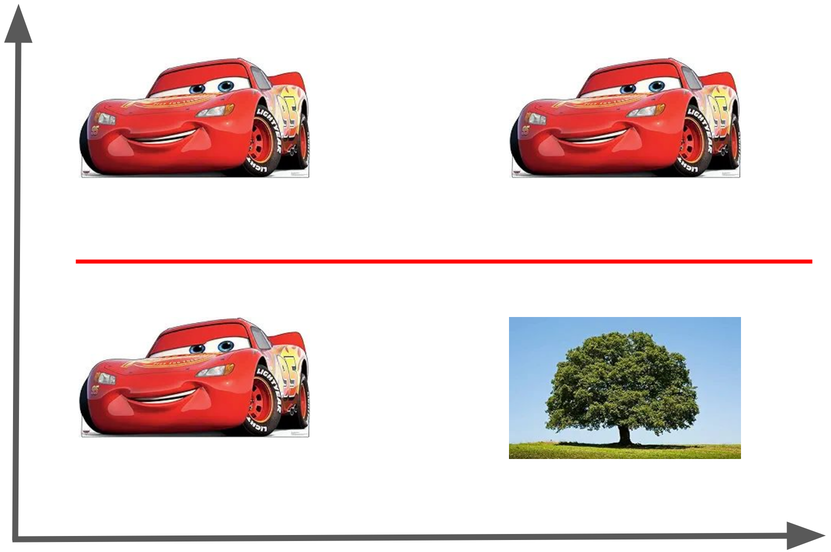
ML Pipelines



Source: https://www.nature.com/articles/srep06367

How do the models learn?

Is this the best way to separate these points?



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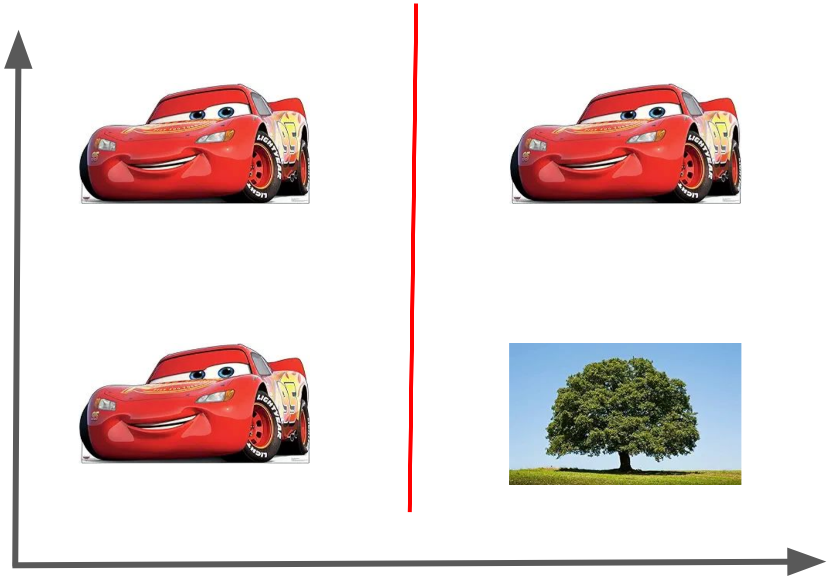

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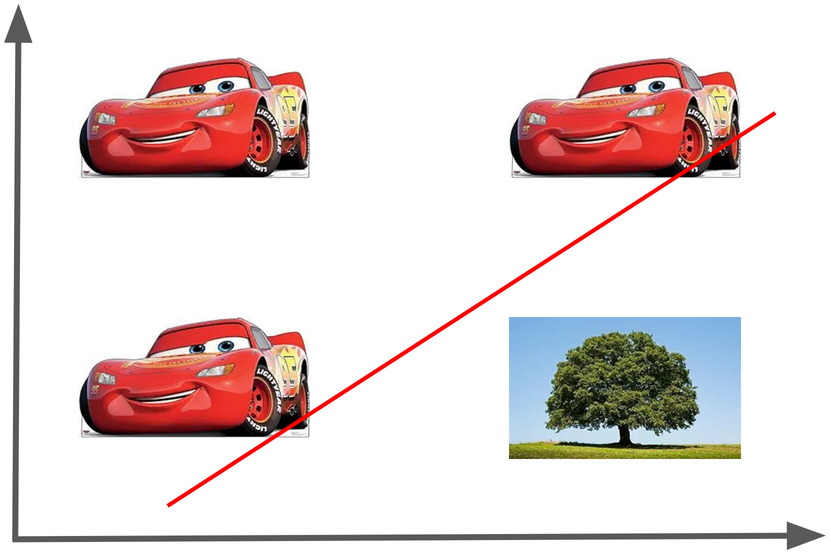
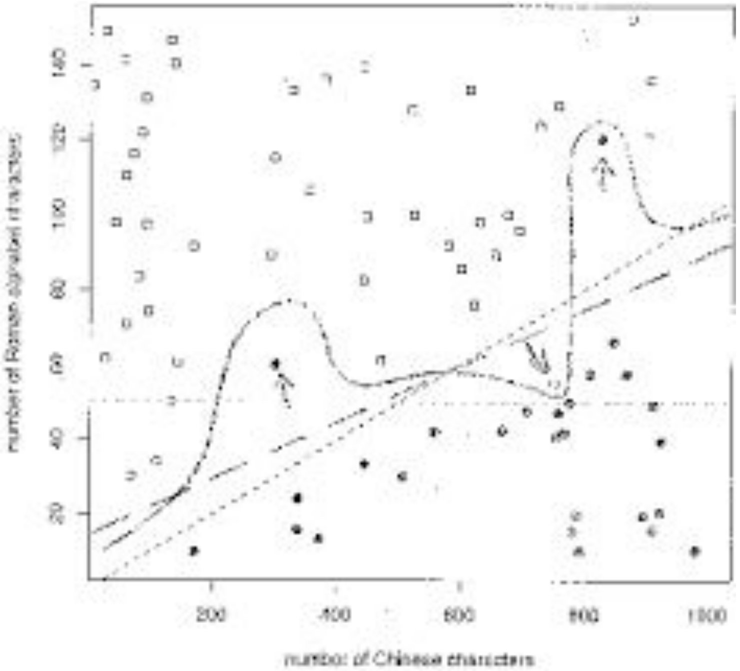


How complex models can be?

Non-Linear Models

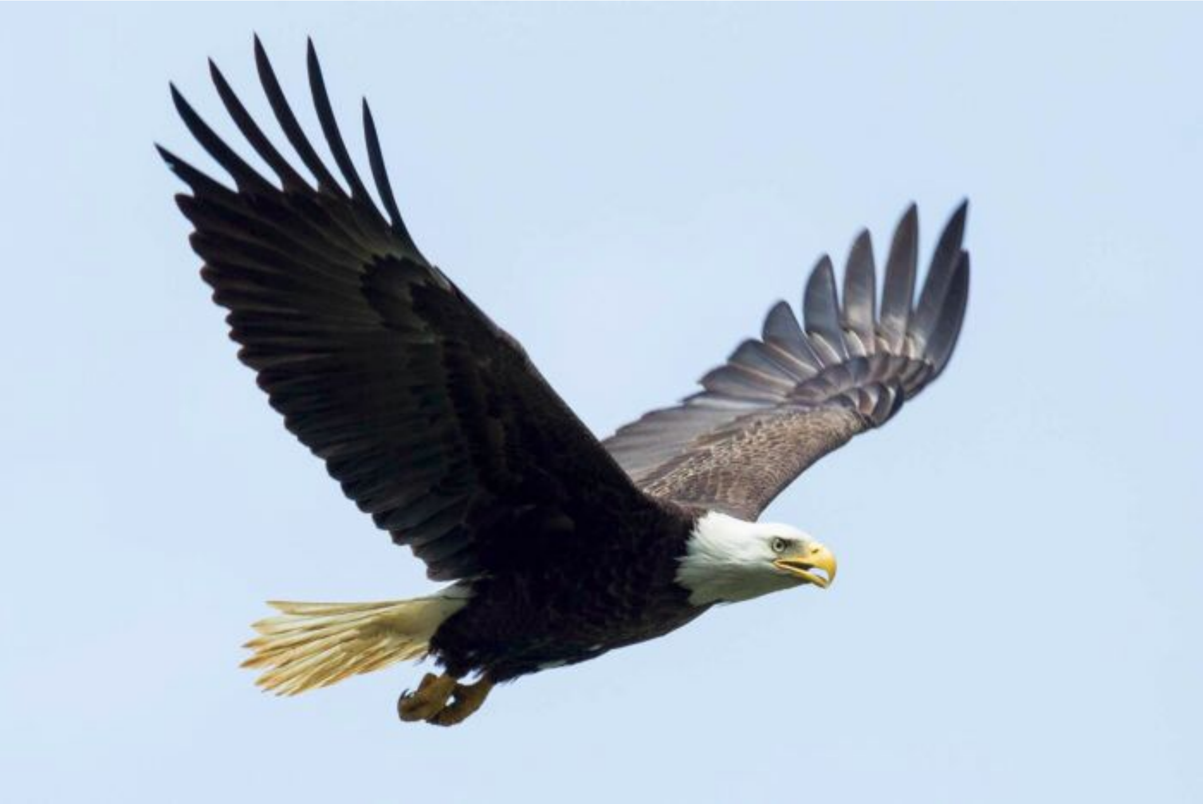


Source: Stanford NLP Group

Is it as easy as keeping extracting features?

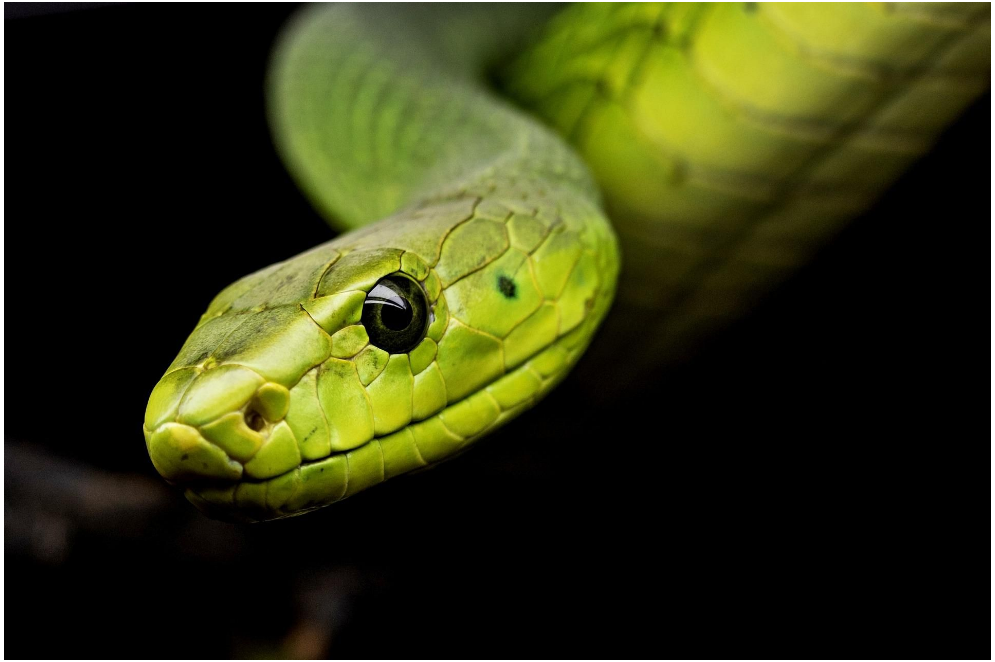
What is a cat?

Is this a cat?



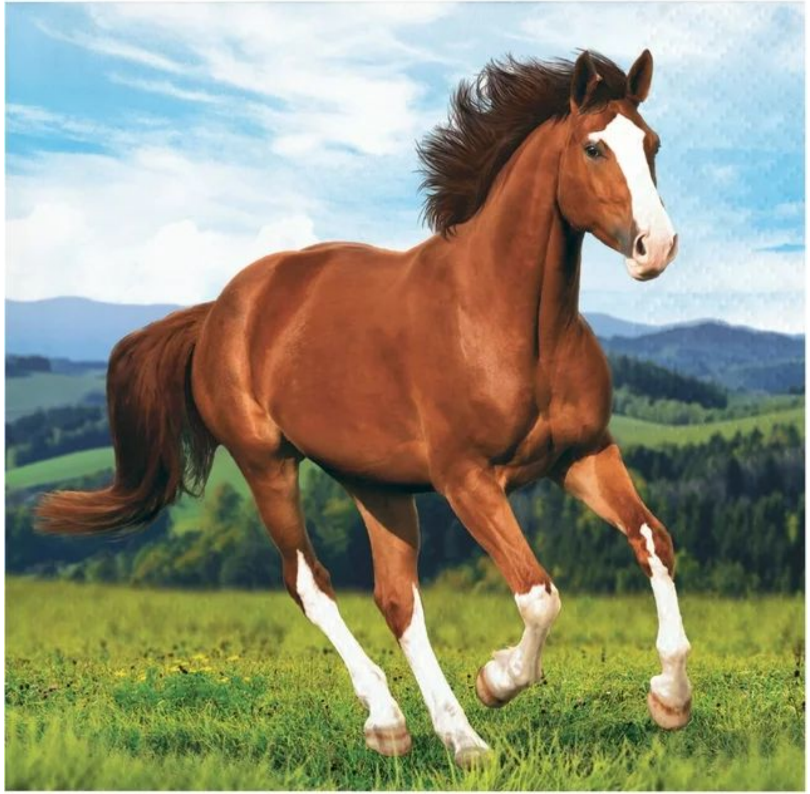
A cat has no wings

Is this a cat?



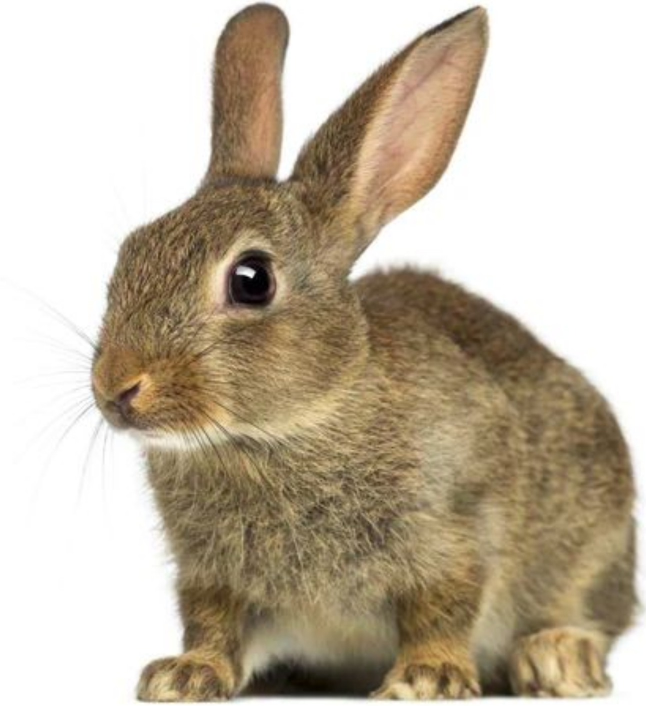
A cat has no wings and 4 legs

Is this a cat?



A cat has no wings, 4 legs, and it is small

Is this a cat?

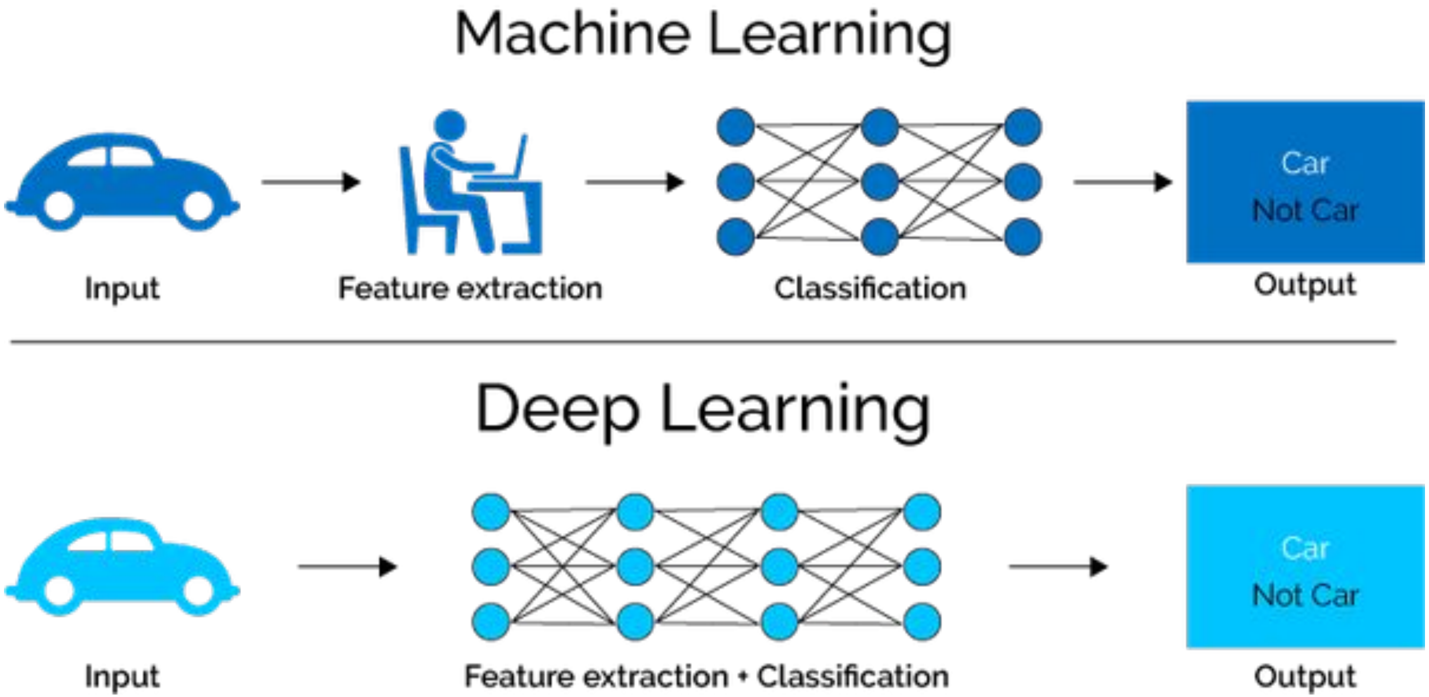


What is a cat?

I DON'T KNOW
BUT I KNOW IT WHEN I SEE IT
imgflip.com

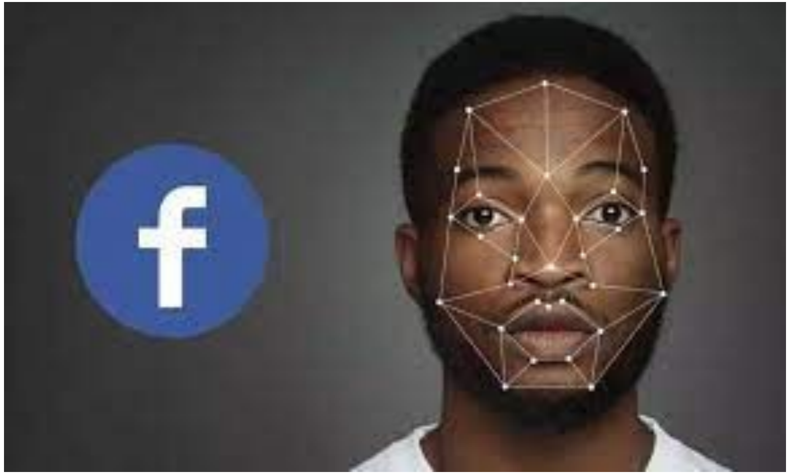
Deep Learning

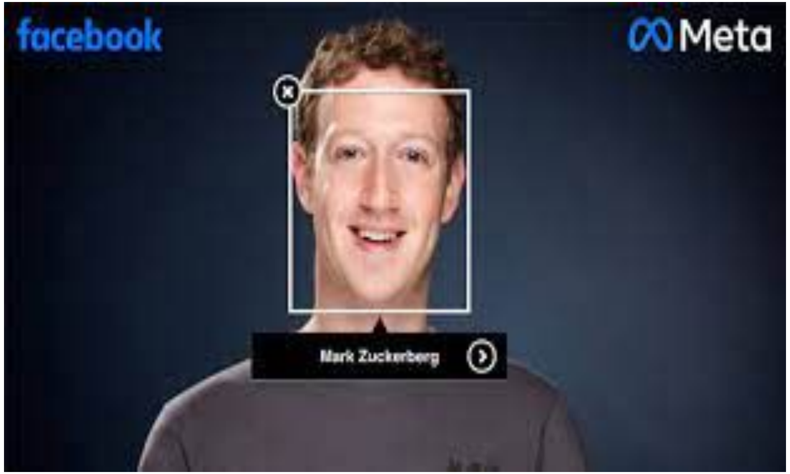
ML vs. DL: Concepts



Source: https://blog.dataiku.com/when-and-when-not-to-use-deep-learning

DL Application: Face Recognition



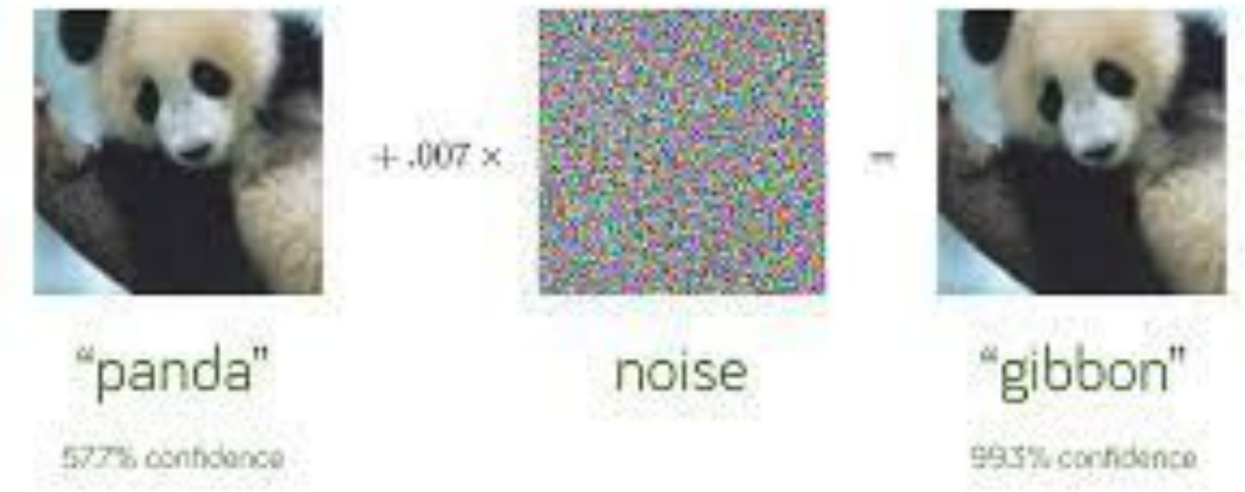


Source: https://www.thehansindia.com/technology/tech-news/facebook-to-shut-down-facial-recognition-feature-713722

Source: https://thehackernews.com/2021/11/facebook-to-shut-down-facial.html

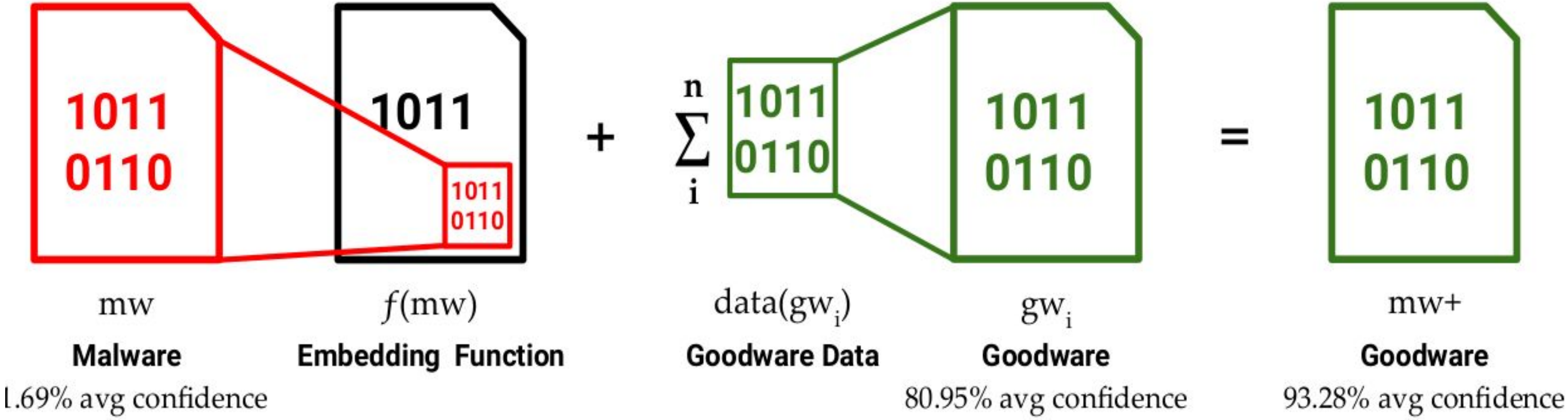
And now we are good, right?

Adversarial Machine Learning



Source: https://towardsdatascience.com/breaking-neural-networks-with-adversarial-attacks-f4290a9a45aa

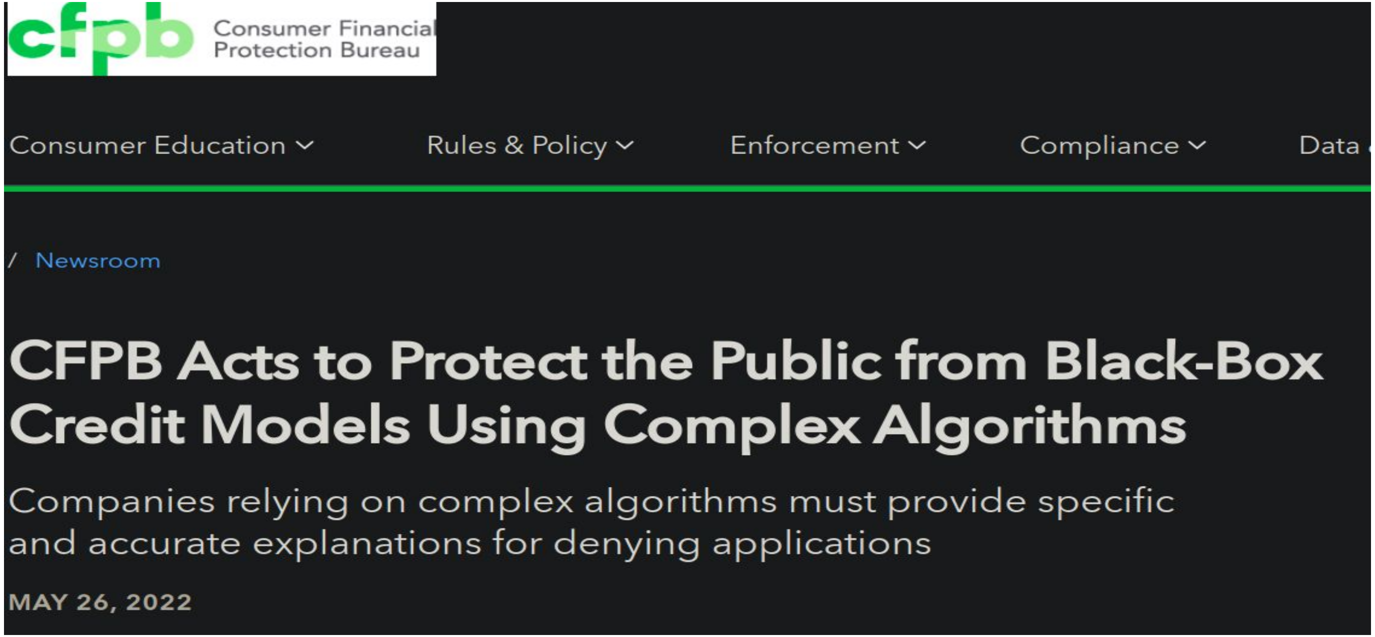
AML: Malware Detector Evasion



Source:
https://marcusbotacin.github.io/publication/2019-01-01-paper-evasion-number-12

But it’s OK in controlled environments, right?

DL: Lack of Explainability



CFPB Acts to Protect the Public from Black-Box Credit Models Using Complex Algorithms

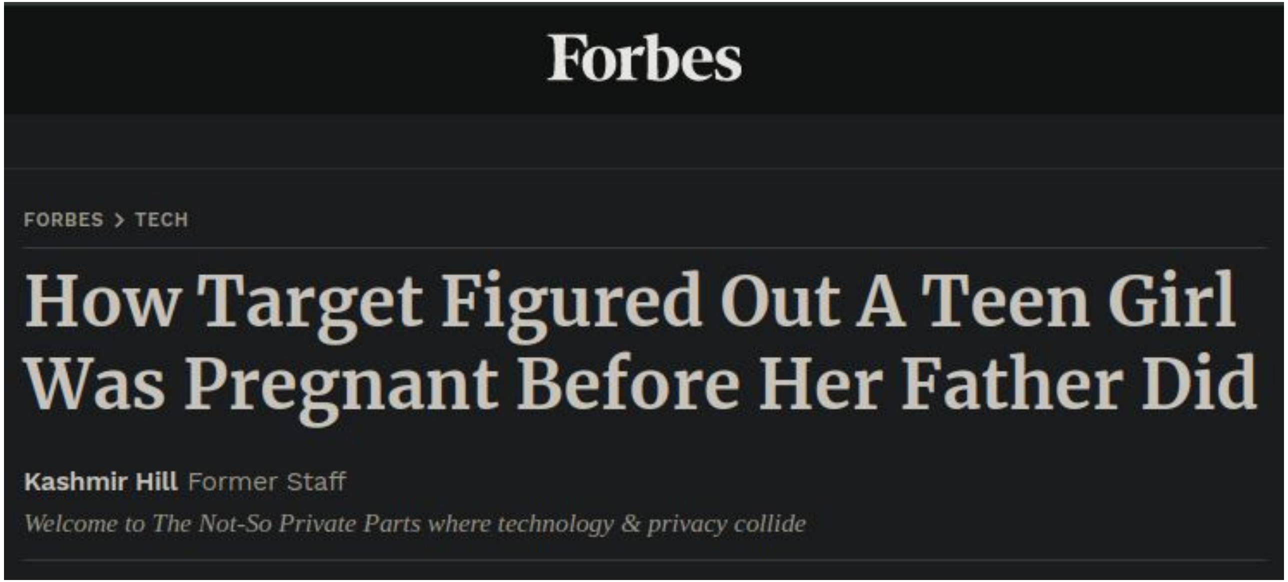
Companies relying on complex algorithms must provide specific and accurate explanations for denying applications

MAY 26, 2022

Source: https://www.consumerfinance.gov/about-us/newsroom/cfpb-acts-to-protect-the-public-from-black-box-credit-models-using-complex-algorithms/

But it’s just to limit it to non-sensitive applications, right?

DL: Lack of Explainability



Forbes

FORBES > TECH

How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did

Kashmir Hill Former Staff

Welcome to The Not-So Private Parts where technology & privacy collide

Source:
https://www.forbes.com/sites/kashmirhill/2012/02/16/how-target-figured-out-a-teen-girl-was-pregnant-before-her-father-did/?sh=979604166686

Natural Language Processing (NLP), Large Language Models (LLMs), and ChatGPT

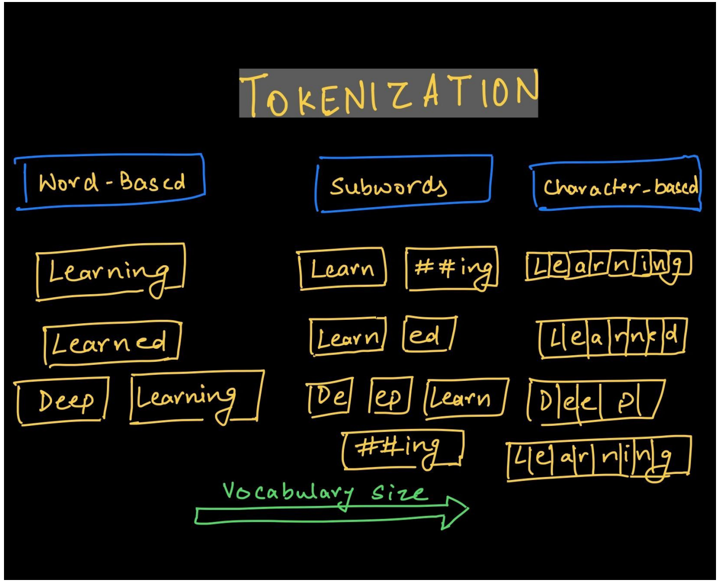
Complete the statements…

1. Happy New …

2. Merry …

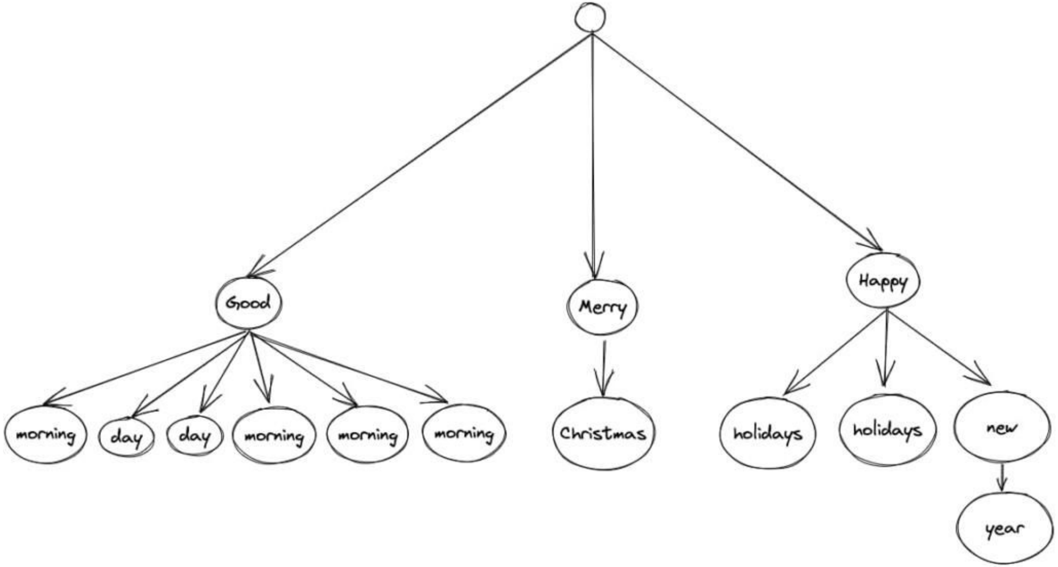
How does it work?

NLP: Tokenization



Source: https://www.freecodecamp.org/news/evolution-of-tokenization/

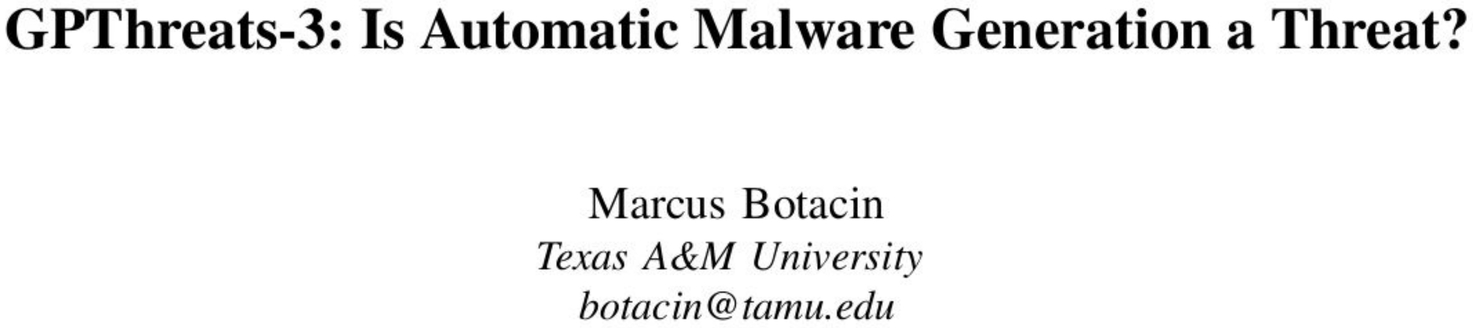
NLP: Text Generation



Source: https://www.sitepen.com/blog/exploring-the-creative-possibilities-of-markov-chains-for-text-generation

Nothing might go wrong, right?

ChatGPT: Automatic Attacks



GPThreats-3: Is Automatic Malware Generation a Threat?

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Texas A&M University

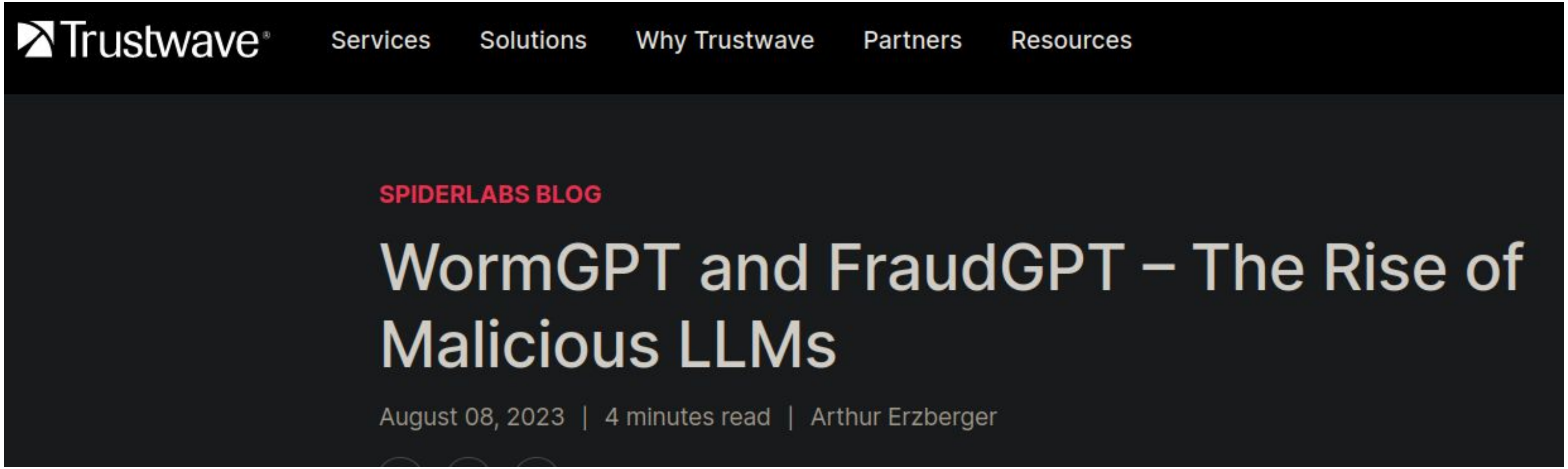
botacin@tamu.edu

Source:
https://marcusbotacin.github.io/publication/2023-05-01-paper-gpt-number-27

But this does not happen in reality, right?

Right?

FraudGPT: Malicious LLMs



SPIDERLABS BLOG

WormGPT and FraudGPT – The Rise of Malicious LLMs

August 08, 2023 | 4 minutes read | Arthur Erzberger

Source: https://www.trustwave.com/en-us/resources/blogs/spiderlabs-blog/wormgpt-and-fraudgpt-the-rise-of-malicious-llms/

How to solve these new problems?

Questions?

A long road Ahead!