AI in Cyber Security

Le magicien quantique[1]

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A bit of Geopolitics

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- Japan: no law on copyright, researchers have full access to data to train their models
- United States: laws, regulations and recommandations

Safe and Effective Systems

Algorithmic Discrimination Protections

Data Privacy

Notice and Explanation

Human Alternatives, Consideration, and Fallback

AI & Defense

AI for Defense (ML4SEC)

- Spams detection ($\sim$ 1960)
- Network intrusion detection (2000)

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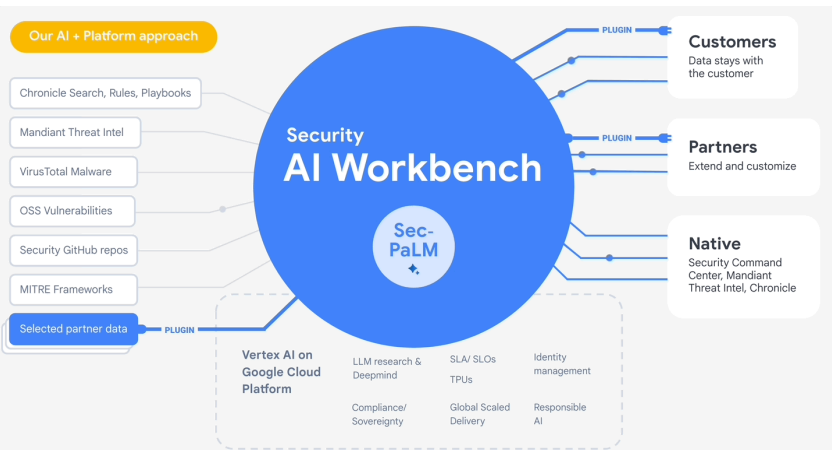
- Reverse and malware detection $\rightarrow$ Google Sec-PaLM



AI & Attacks

AI for Attack

- Adversarial attacks on AI powered defenses
- Phishing, spear phishing
- Deepfakes
- Targetted missinformation
- Web fuzzing
- Botnet control
- Hiding malwares insides images
- ...

Attacking AI models

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Data poisoning

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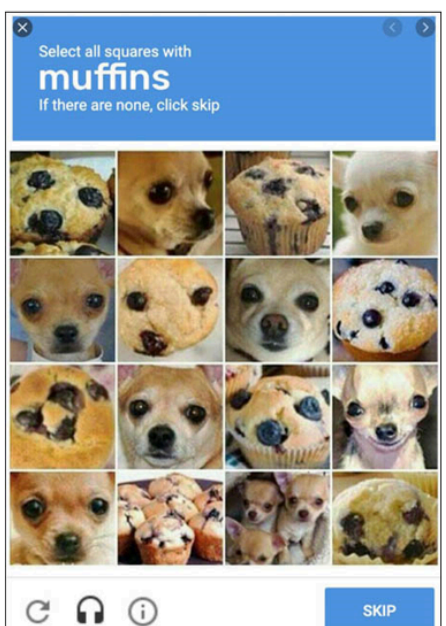

Attacking AI models

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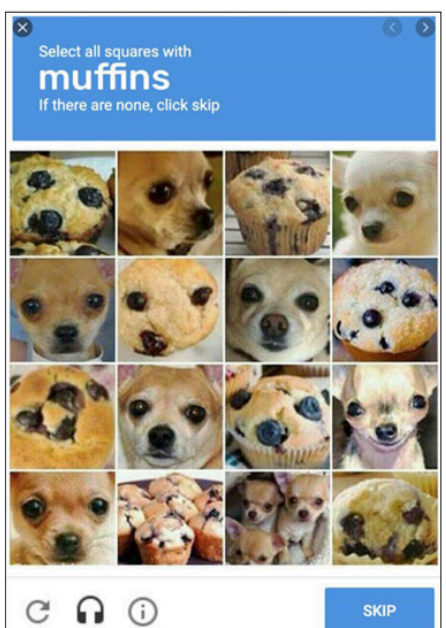
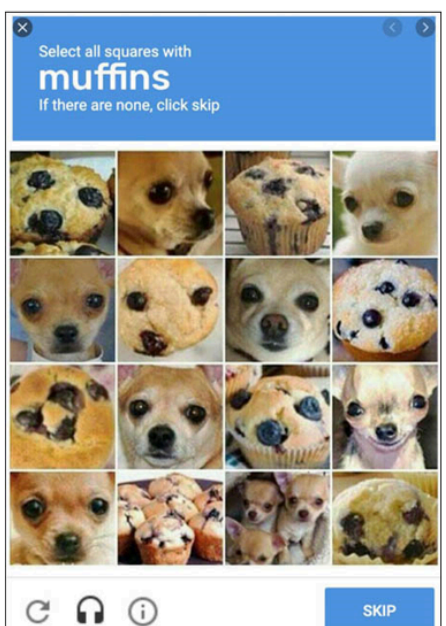


Data extraction

Attacking AI models

Data poisoning



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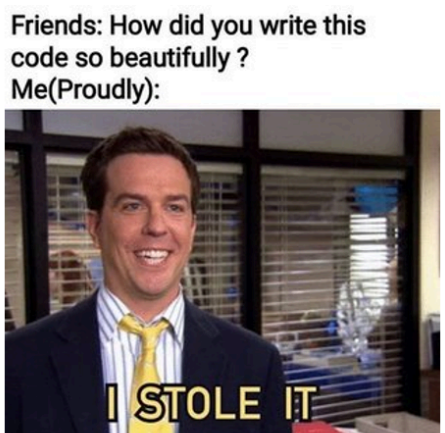

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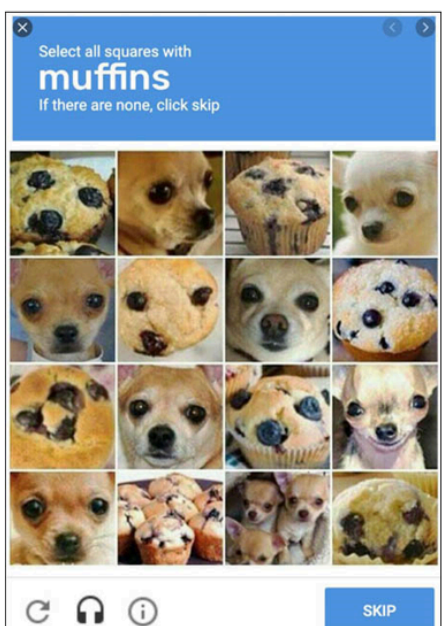

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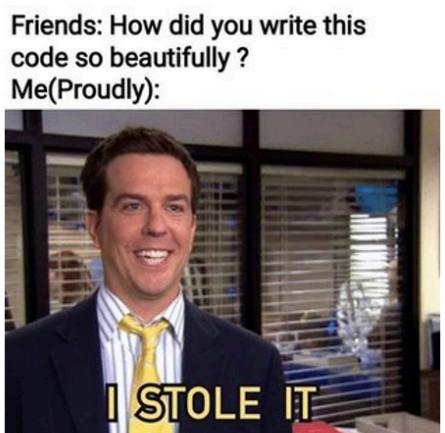
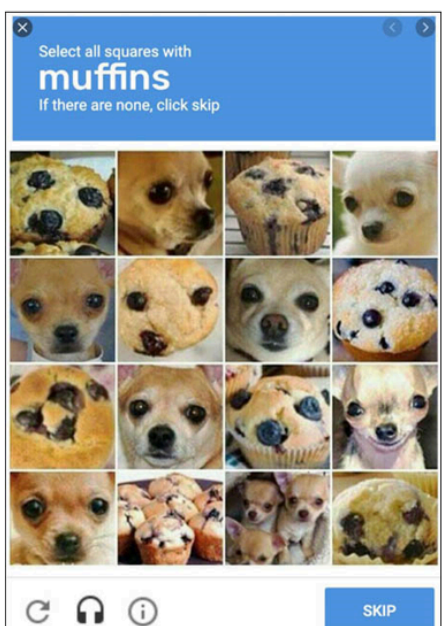


Adversarial attacks

Attacking AI models

Data poisoning



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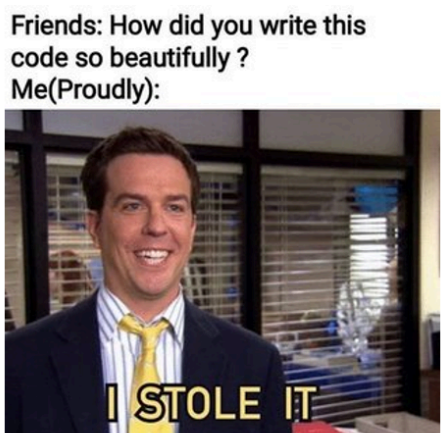
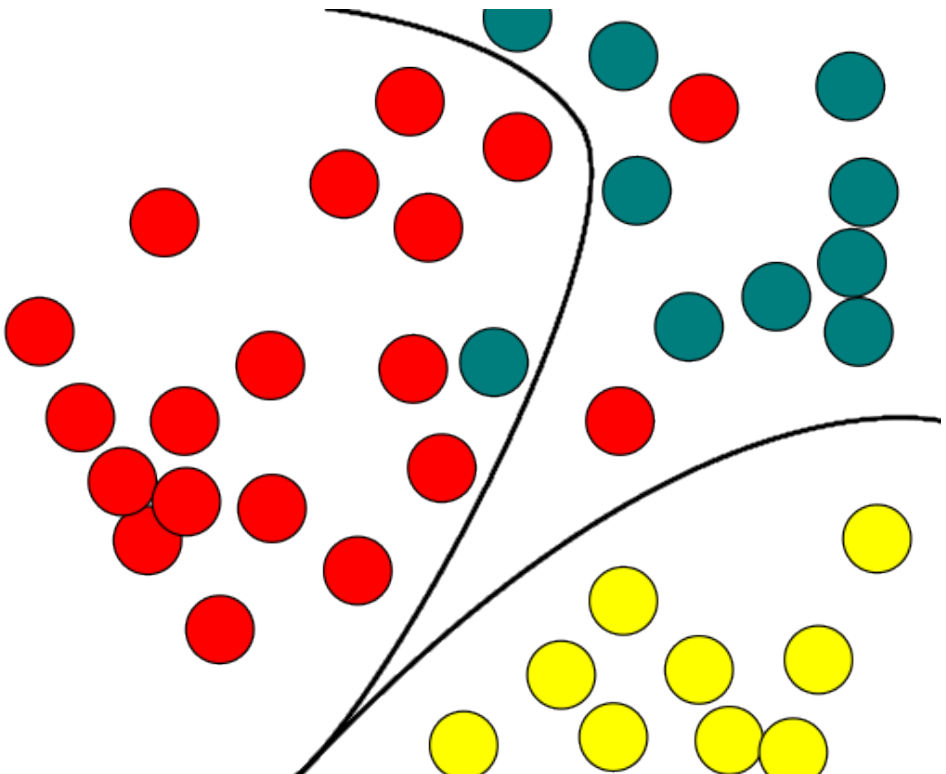


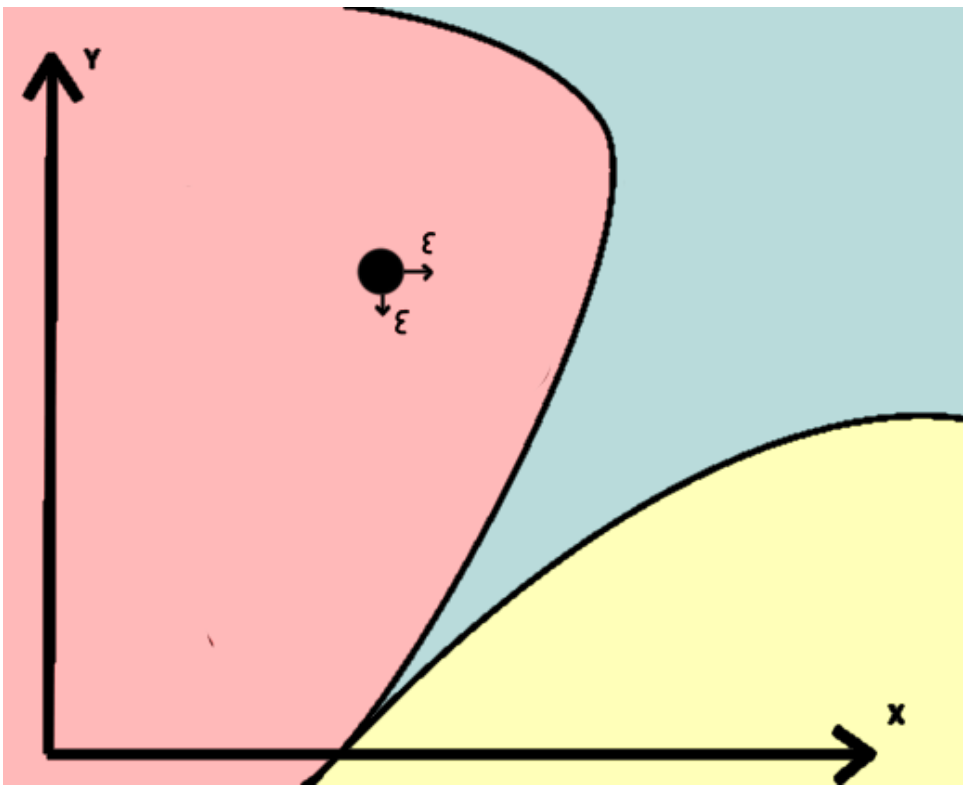
Adversarial attacks

Attacking Classifiers

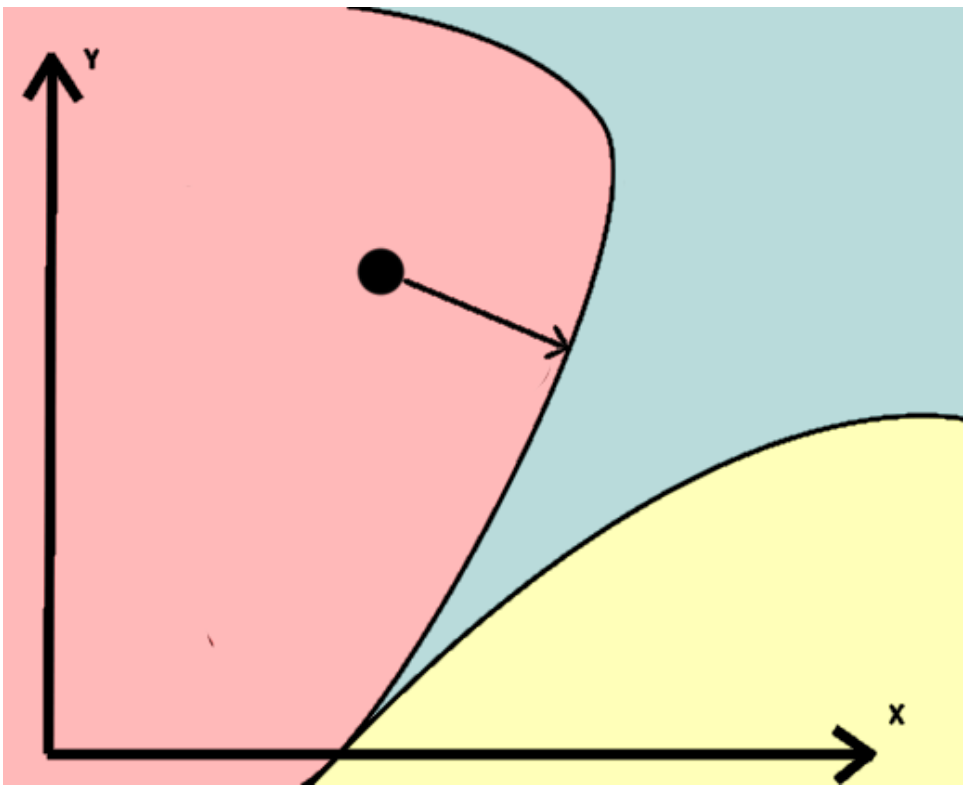
What is a classifier?



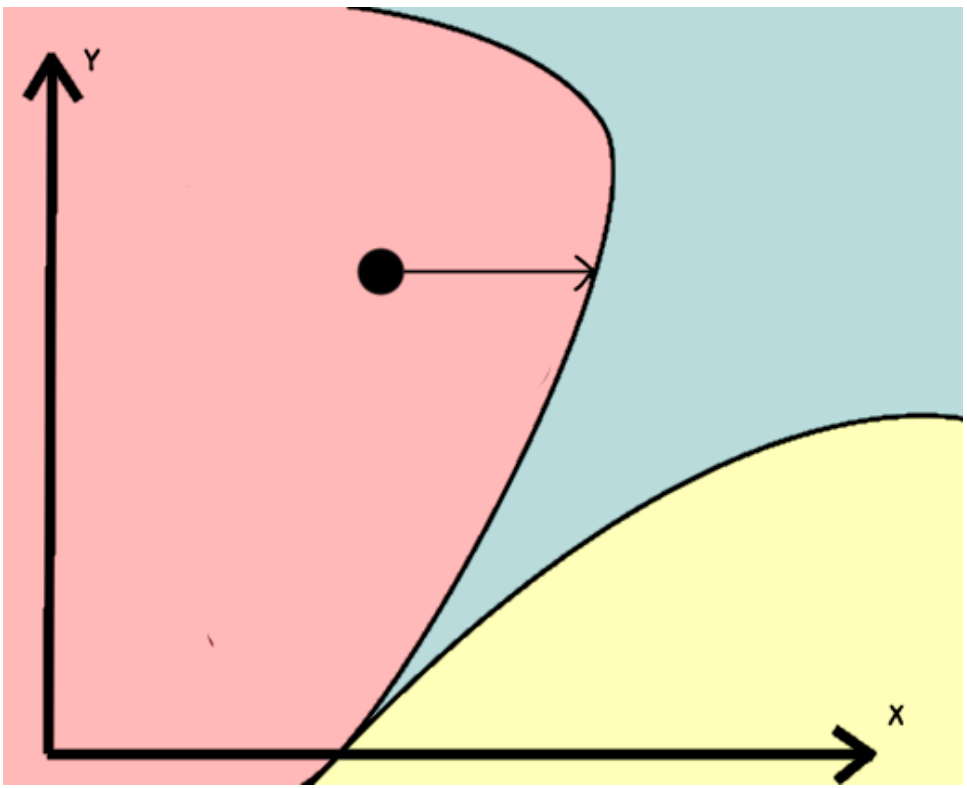
L_∞ norm



L_2 norm



L_0 norm



Whitebox Adversarial Attacks

- Fast Gradient Sign Method (FGSM): L_∞
- Basic Iterative Method (BIM): L_∞

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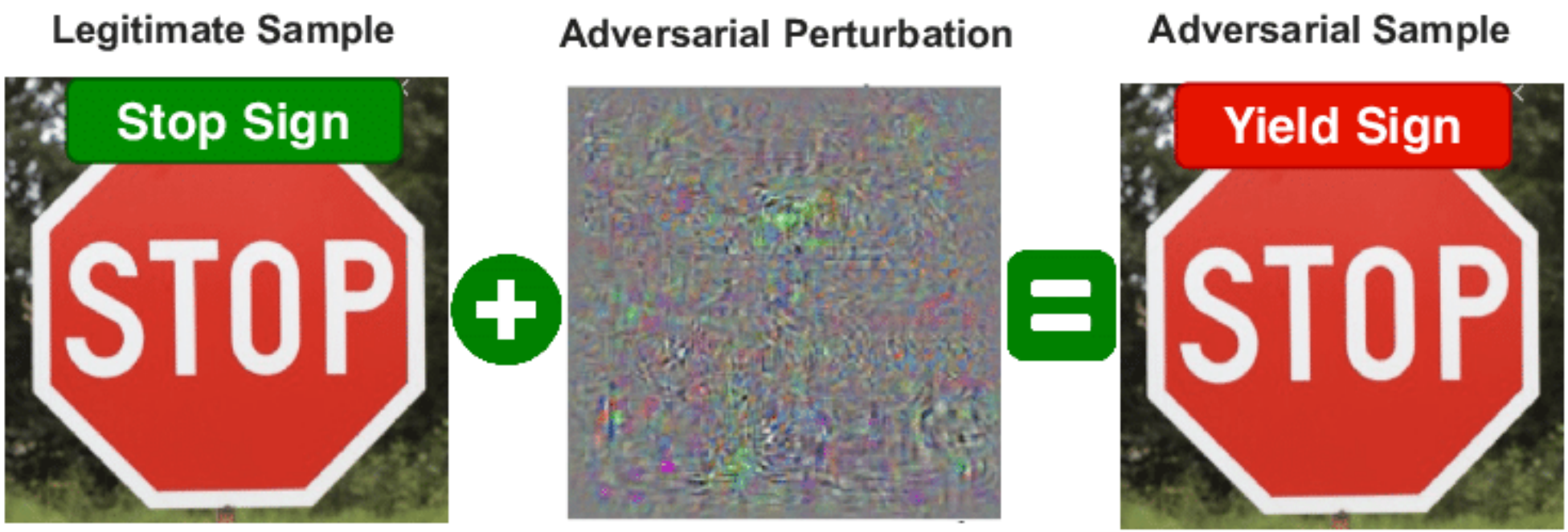
- Jacobian-based Saliency Maps Attacks (JSMA): L_0
- Carlini and Wagner (CW): L_∞, L_2, L_0

Blackbox Adversarial Attacks

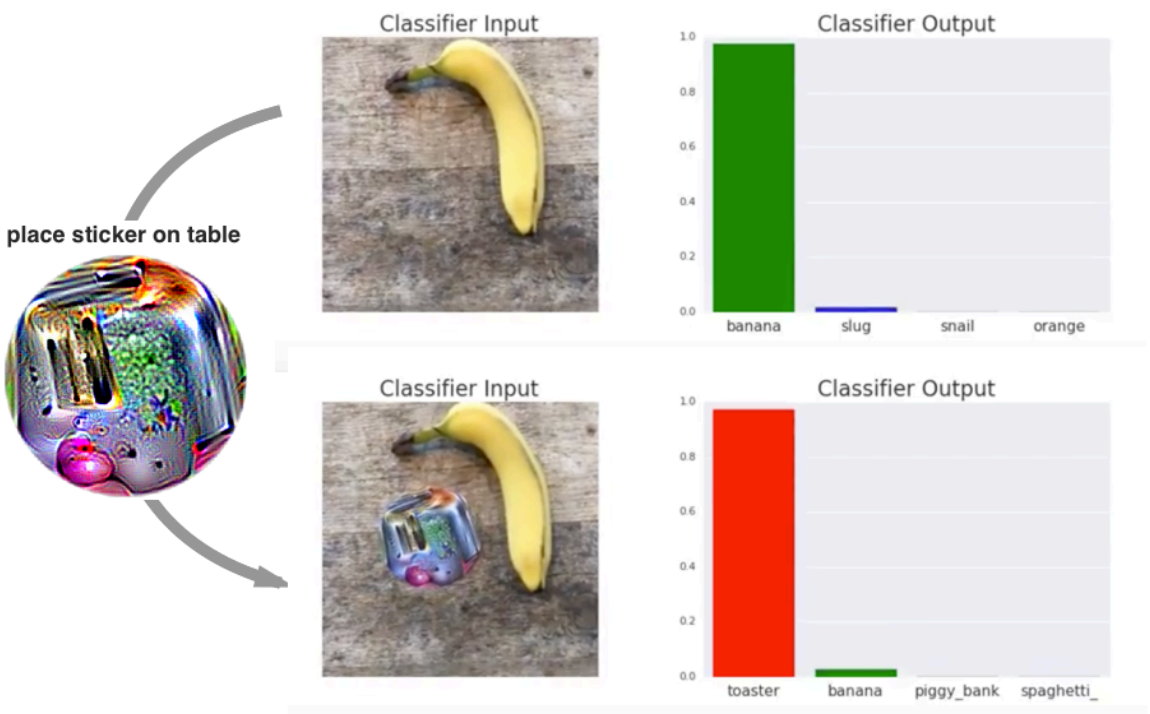
- Zeroth Order Optimisation attack (ZOO)
- Transferable Attentive Attack (TAA)
- Attack Inspired GAN (AI-GAN)

Examples

FGSM noise attack: L_∞



JSMA patch attack: L_0



Practice!