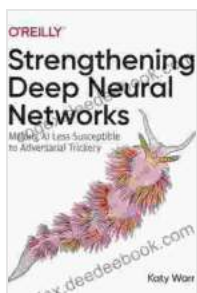


Making AI Less Susceptible to Adversarial Trickery

Artificial intelligence (AI) has become increasingly powerful in recent years, but it is also becoming more vulnerable to adversarial attacks. These attacks exploit the fact that AI models are often trained on data that is not representative of the real world, and can be fooled by carefully crafted examples that are designed to cause the model to make mistakes.

Adversarial attacks are a serious threat to the security of AI systems, and there is a growing need for techniques to make AI more robust against these attacks. In this article, we will discuss some of the most common techniques for making AI less susceptible to adversarial trickery, including adversarial training, data augmentation, and model ensembling.



Strengthening Deep Neural Networks: Making AI Less Susceptible to Adversarial Trickery by Katy Warr

★★★★☆ 4.1 out of 5

Language : English
File size : 30953 KB
Text-to-Speech : Enabled
Screen Reader : Supported
Enhanced typesetting : Enabled
Print length : 360 pages



Adversarial Training

Adversarial training is a technique that involves training an AI model on a dataset that includes adversarial examples. This forces the model to learn to generalize better to real-world data, and makes it less likely to be fooled by adversarial attacks.

To create adversarial examples, researchers can use a variety of techniques, such as gradient-based methods, fast gradient sign method (FGSM), or projected gradient descent (PGD). These methods involve modifying the input data in a way that maximizes the model's loss function, while keeping the perturbation small enough that the human eye cannot detect it.

Here is a general overview of how adversarial training works:

1. Train an initial AI model on a clean dataset.
2. Generate adversarial examples for the trained model.
3. Retrain the model on the original dataset augmented with the adversarial examples.
4. Repeat steps 2 and 3 until the model achieves satisfactory robustness against adversarial attacks.

Adversarial training has been shown to be effective against a wide range of adversarial attacks, and is one of the most commonly used techniques for making AI more robust.

Data Augmentation

Data augmentation is a technique that involves increasing the size and diversity of the training data by applying random transformations to the

original data. This makes the model more robust to noise and variations in the input data, and less likely to be fooled by adversarial attacks.

Some common data augmentation techniques include:

- Flipping the image horizontally or vertically
- Rotating the image by a random angle
- Adding noise to the image
- Cropping the image to a different size or aspect ratio

Data augmentation can be applied to any type of data, including images, text, and audio. It is a simple and effective technique that can significantly improve the robustness of AI models to adversarial attacks.

Model Ensembling

Model ensembling is a technique that involves combining multiple AI models to make a single prediction. This makes the overall model more robust to adversarial attacks, as it is less likely that all of the models will be fooled by the same attack.

There are a variety of ways to ensemble models, such as:

- **Majority voting:** The ensemble makes a prediction based on the majority vote of the individual models.
- **Weighted averaging:** The ensemble makes a prediction based on the weighted average of the individual models' predictions.

- **Stacking:** The ensemble uses the predictions of the individual models as features for a new model that makes the final prediction.

Model ensembling can be an effective way to improve the robustness of AI models to adversarial attacks. However, it is important to note that ensembling can also increase the computational cost of the model.

Other Techniques

In addition to the three techniques discussed above, there are a number of other techniques that can be used to make AI less susceptible to adversarial trickery. These include:

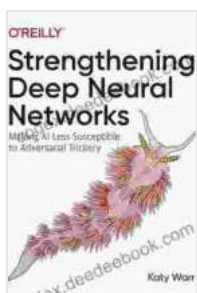
- **Adversarial regularization:** This technique involves adding a term to the model's loss function that penalizes the model for making predictions that are inconsistent with the adversarial examples.
- **Defensive distillation:** This technique involves training a new model on the output of an existing model that has been trained on adversarial examples. The new model is then more robust to adversarial attacks.
- **Verification:** This technique involves checking the output of the model on a small set of test data that is known to be free of adversarial examples. If the model makes a mistake on any of the test data, then it is likely that the model has been fooled by an adversarial attack.

The choice of which technique to use depends on the specific AI model and the type of adversarial attack that is being considered. It is often necessary to use a combination of techniques to achieve the best possible robustness.

Adversarial attacks are a serious threat to the security of AI systems. However, there are a number of techniques that can be used to make AI more robust against these attacks. By using these techniques, we can help to ensure that AI is used for good and not for evil.

Here are some additional resources that you may find helpful:

- Adversarial Training Methods for Deep Neural Networks
- Data Augmentation for Adversarial Defense: A Survey
- Ensemble Adversarial Training: Attacks and Defenses

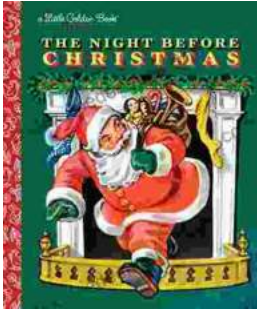


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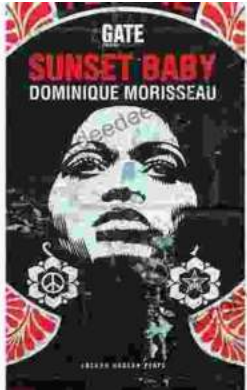
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