**王：**Hello everyone, today we will introduce diiffusion model to you

**王**：Have you seen these pictures? Of course these pictures are not real. How did Trump get arrested? These pictures are actually images that the ai generates from the pictures. Ai-generated images have achieved rapid development in recent years, and various image generation models have been successively released. GANs, VAEs, and Diffusion Model are among the best. Today we're going to introduce you to the most widely used model today, the diffusion model.

We will introduce it from the following aspects

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**王**：This technique has many applications in image generation, such as image generation from image, image generation from text, and video generation.

**王**：Although the diffusion model is already a relatively mature model. However, it still has some shortcomings. (You can see here)

First, the sampling speed of the diffusion model is slow. This is due to the fact that their de-noising process is iterative, requiring multiple steps and complex calculations. This also causes it to require a lot of computing power.

Limited Sample Diversity is also a disadvantage of diffusion model. Although the quality of generation is high, diffusion models may face limitations in sample diversity. The generated images tend to be similar, lacking sufficient variation.

There are many other drawbacks like Low Interpretability. We won't go into that here.

Scholars around the world have done a lot of research to overcome these shortcomings. For example, initially, the model must compute at least 50 to 100 steps sequentially to achieve high-quality images. With the development of the times, the speed gradually shortened to 15 to 20 steps. Shown on the right is a model from Tsinghua University called DPM-Solver, which reduce the time to only 10 to 15 steps again.

In addition, universities all over the world are making their own efforts to improve this model, which will not be detailed here

Limited Sample Diversity especially show in Generating samples with repetitive features. Such as Facial Feature Convergence, Repetitive Background Content, Repetitive Object Structure and Repetitive Colors and Lighting.

王：If you want to use these image generation models, you can go to github and download stable-diffusion-webui, a user version of the useful diffusion model. Install a dependency like pytorch, then go to the civilai and download the user-trained model, or train one yourself to use

