



趋势与展望 生成式AI技术助力Unity创作

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Unity中国AI技术负责人



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- 从AI绘画和ChatGPT说起
- 生成式AI技术趋势及影响
- 3D内容的AI生成技术路径
- AI助力Unity创作方式展望

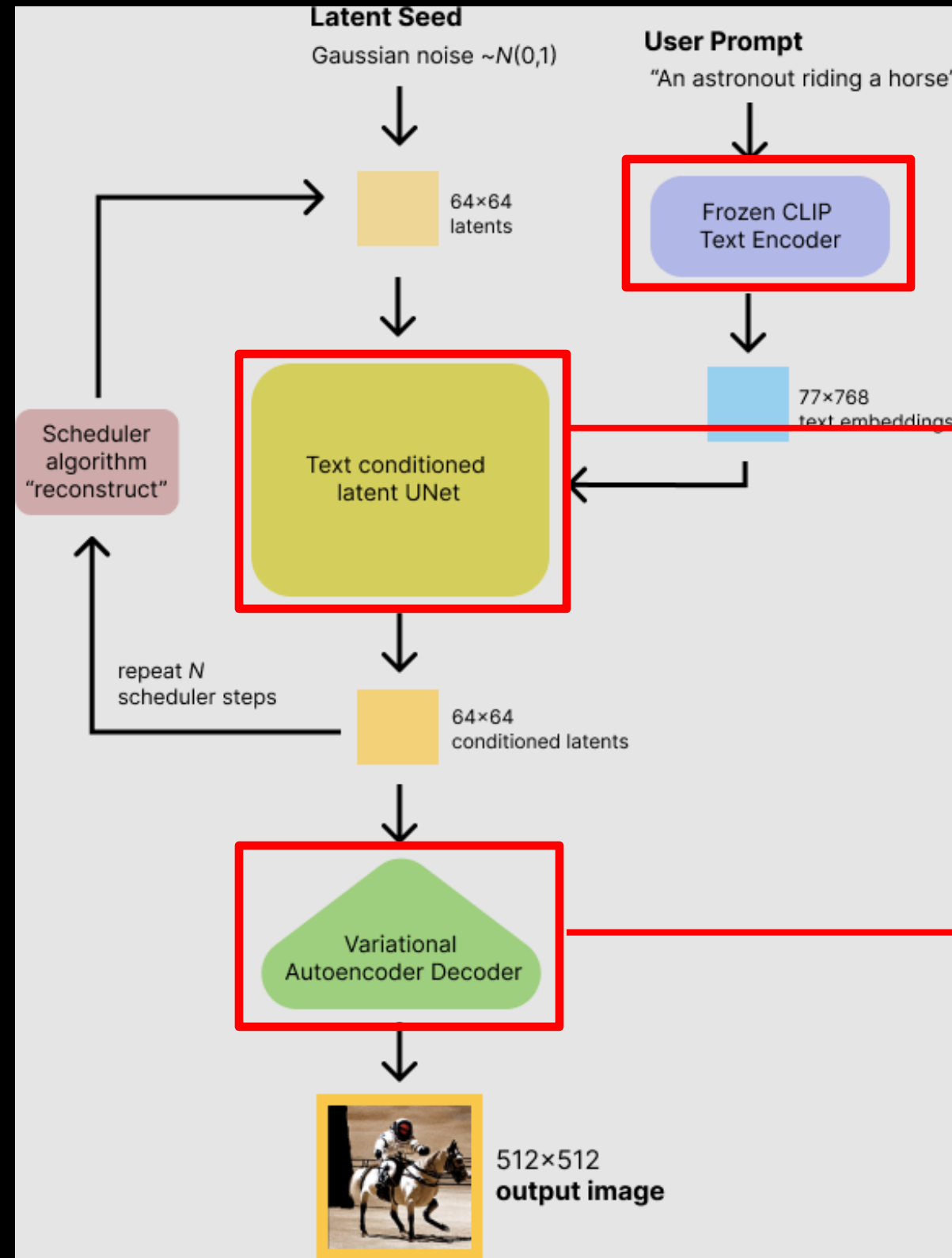
从AI绘画和ChatGPT说起

- 2022年4月，DALL-E 2 发布
- 2022年7月，Midjourney open-beta上线
- 2022年8月，Stable Diffusion发布
- 2022年11月，ChatGPT发布
- 2023年1月，ChatGPT用户量过亿
- 2023年2月，Midjourney用户量过千万
- 2023年3月，GPT-4发布
- 2023年3月，要求暂停研发强AI的联名信
- 2023年5月，ChatGPT Plugins开放

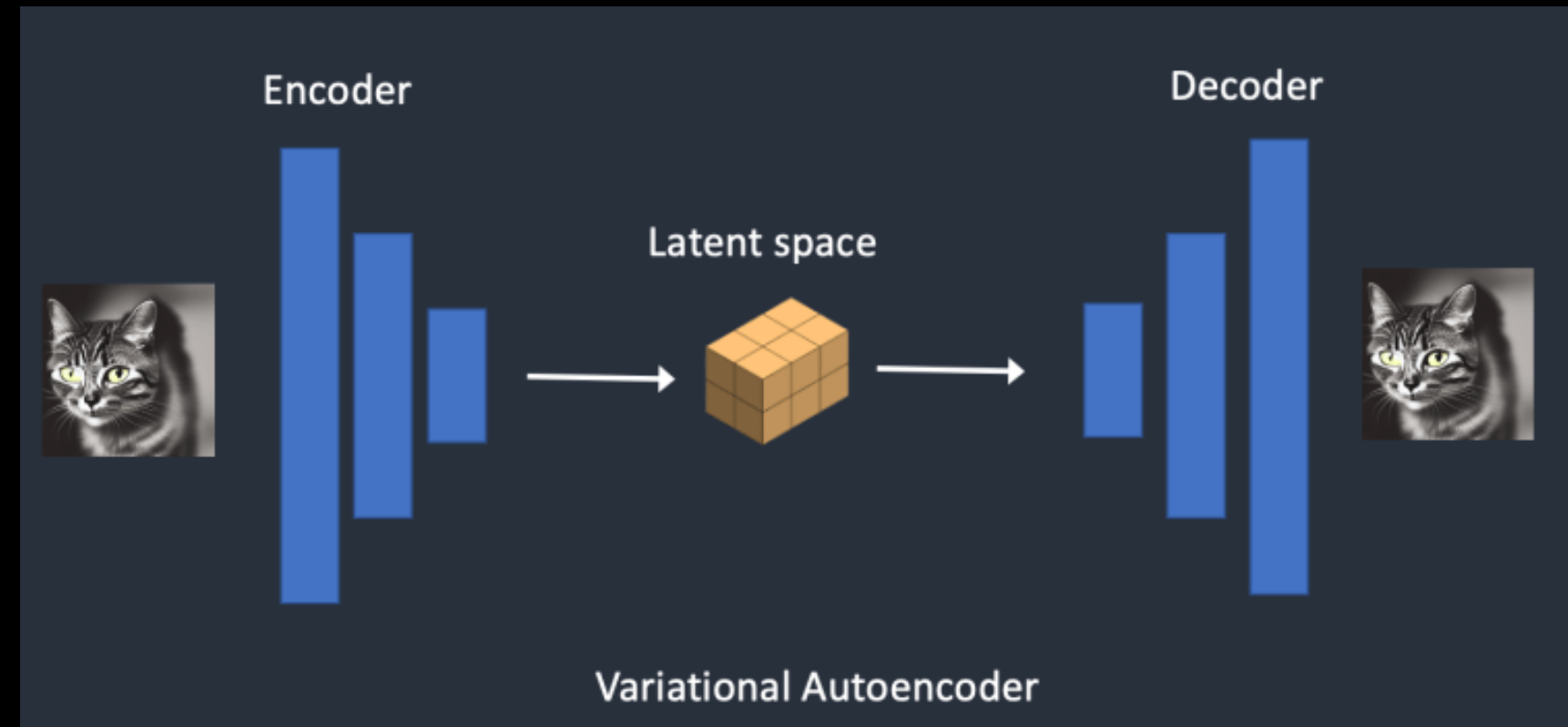
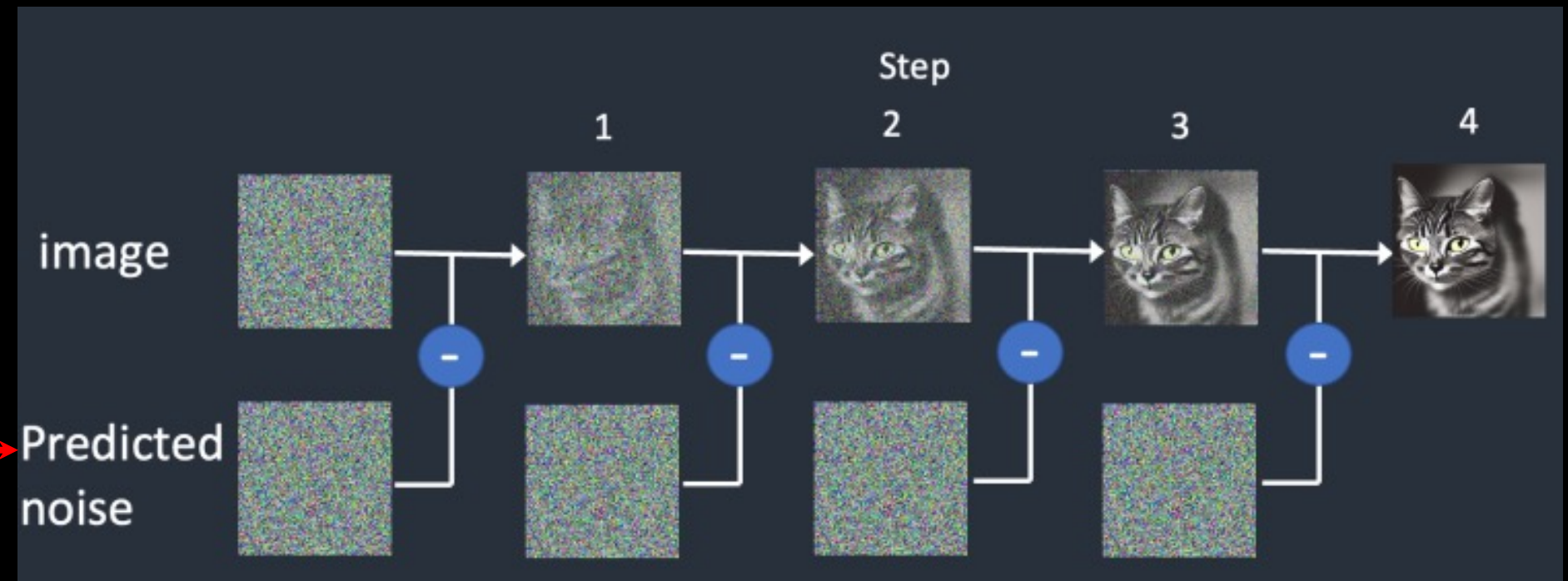




AI绘画 – Stable Diffusion



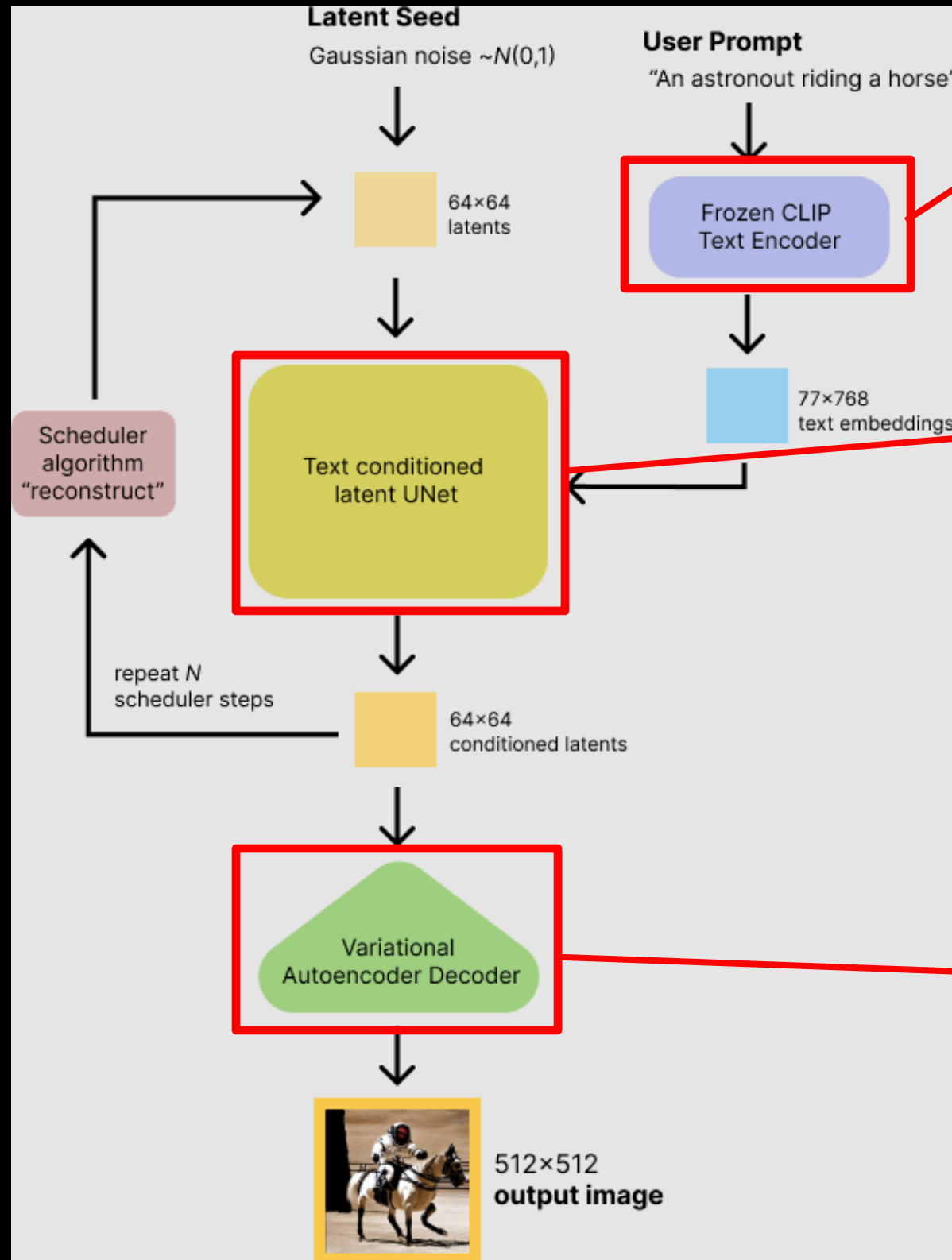
https://huggingface.co/blog/stable_diffusion



<https://stable-diffusion-art.com/how-stable-diffusion-work/>



AI绘画 – Stable Diffusion



- CLIP-Text Encoder模型：
 - 模型参数量：1.2亿
 - 训练数据：4亿（图片文本对）
 - 训练算力：256*V100 GPU*两周
- Stable Diffusion-v1.5模型：
 - 模型参数量：8.6亿
 - 训练数据：LAION-5B子集
 - LAION-2B-en: 23亿（图片文本对）
 - LAION-5B-1024: 1.7亿
 - LAION-Aesthetics v2 (5+)：6亿
 - 训练算力: 256*A100 GPU
- Autoencoder模型：
 - 模型参数量：0.5亿（Decoder）
 - 训练数据：OpenImages (2千万) + LAION-A/H
 - 训练算力：16*A100 GPU



大语言模型 – GPT生成模型预训练

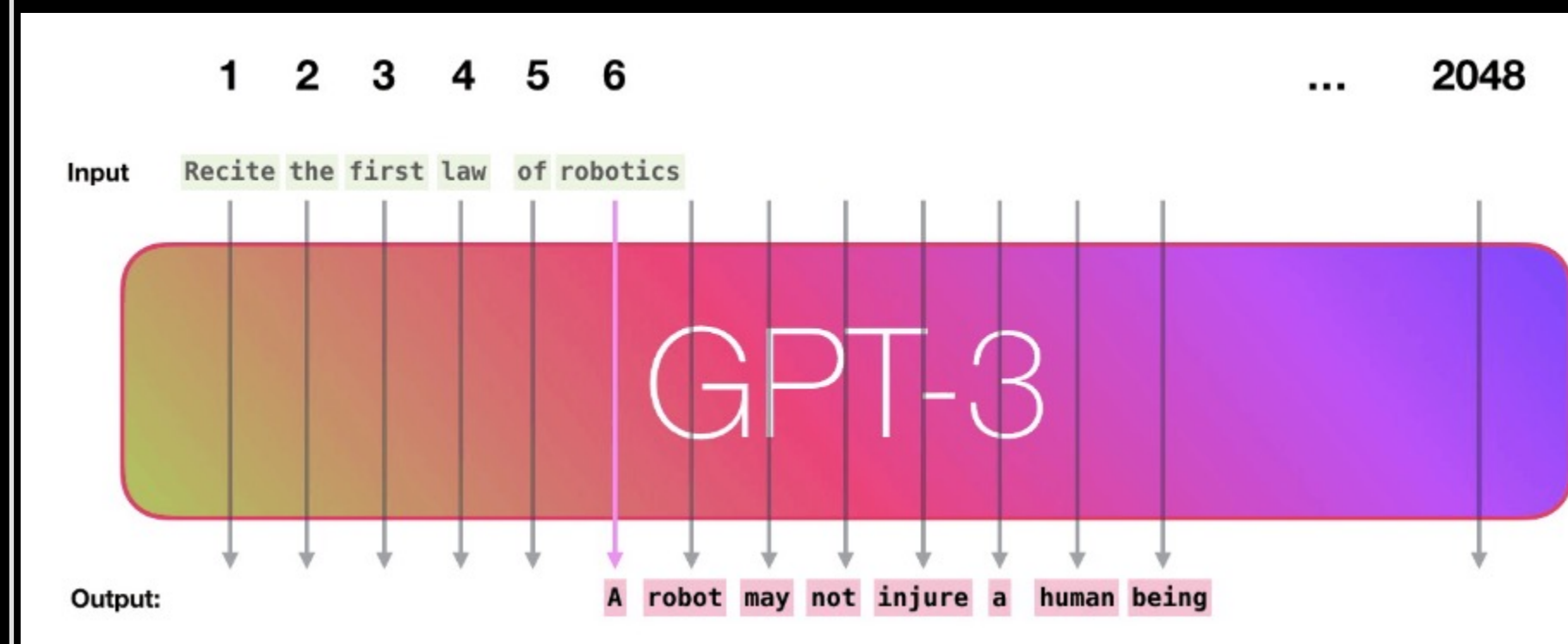
Text: Second Law of Robotics: A robot must obey the orders given it by human beings



Generated training examples

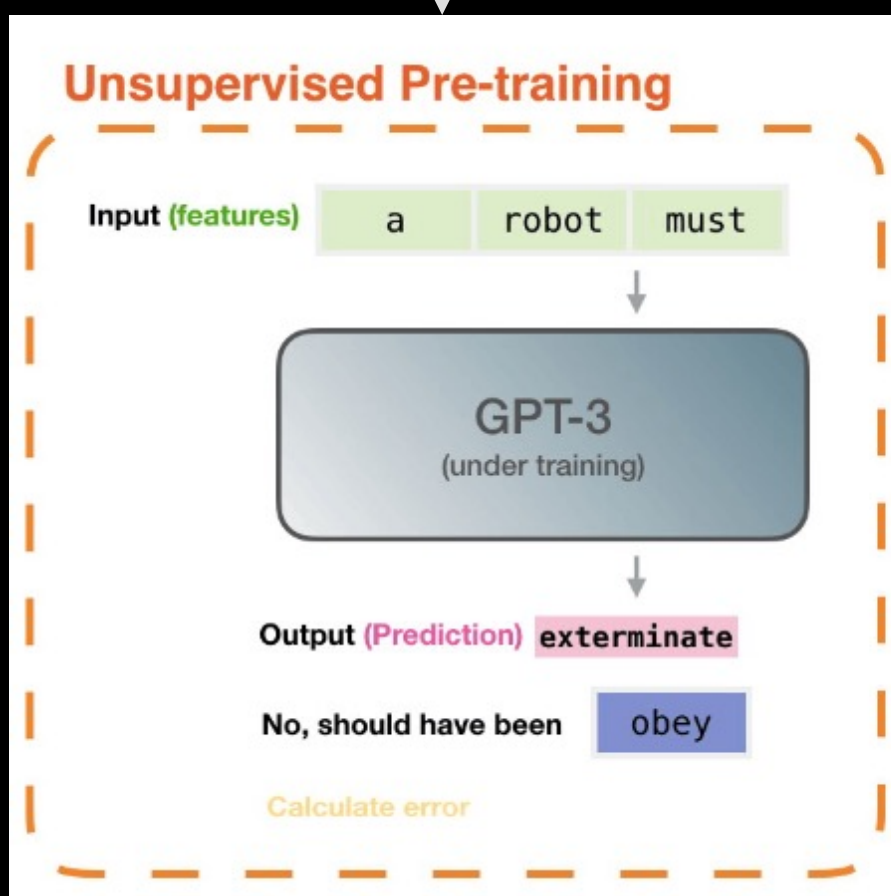
Example #	Input (features)	Correct output (labels)
1	Second law of robotics :	a
2	Second law of robotics : a	robot
3	Second law of robotics : a robot	must
...		

训练



推理

大语言模型 – ChatGPT意图对齐训练

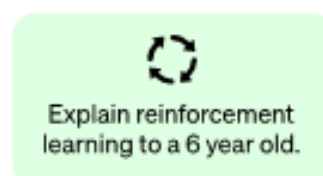


无监督预训练

Step 1

Collect demonstration data and train a supervised policy.

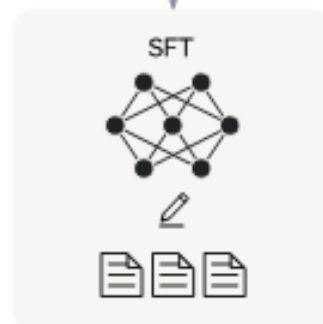
A prompt is sampled from our prompt dataset.



A labeler demonstrates the desired output behavior.



This data is used to fine-tune GPT-3.5 with supervised learning.

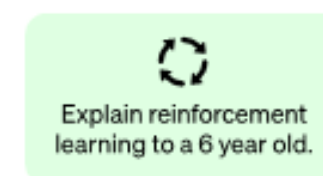


有监督微调(SFT)

Step 2

Collect comparison data and train a reward model.

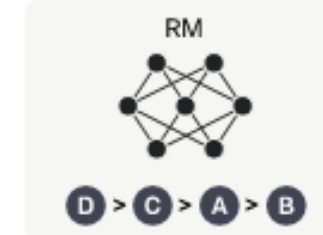
A prompt and several model outputs are sampled.



A labeler ranks the outputs from best to worst.



This data is used to train our reward model.



奖励模型训练(RM)

Step 3

Optimize a policy against the reward model using the PPO reinforcement learning algorithm.

A new prompt is sampled from the dataset.



The PPO model is initialized from the supervised policy.



The policy generates an output.



The reward model calculates a reward for the output.



The reward is used to update the policy using PPO.



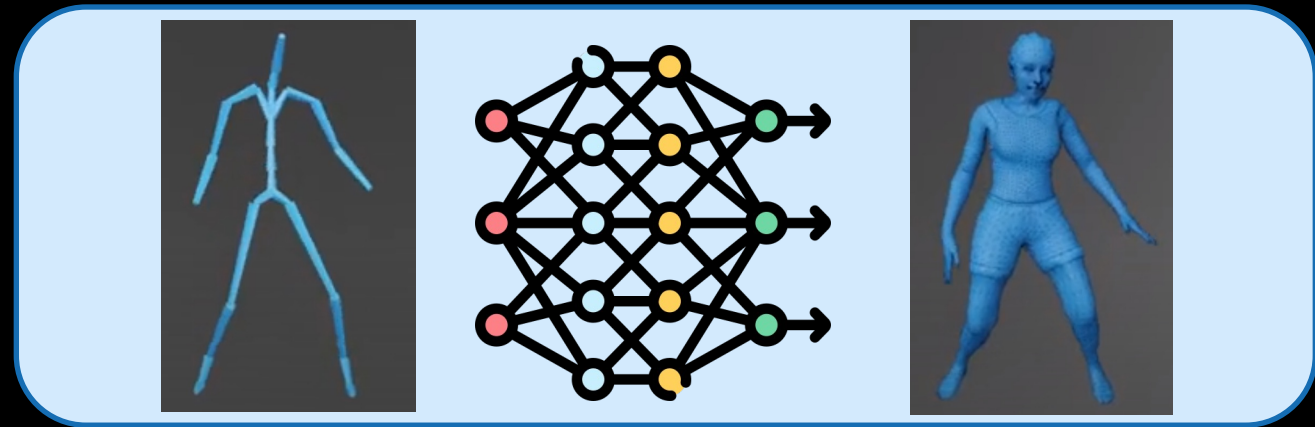
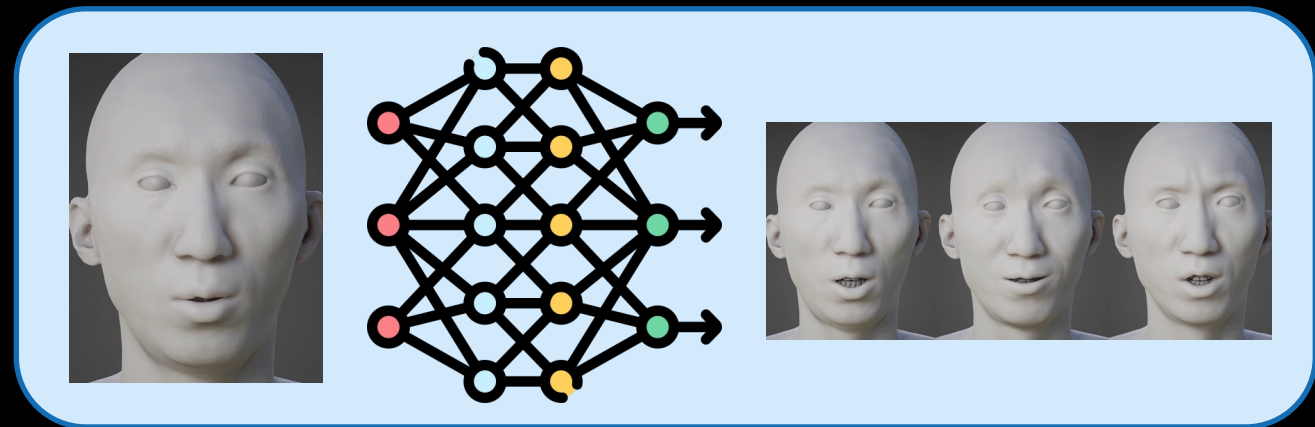
强化学习训练(PPO)



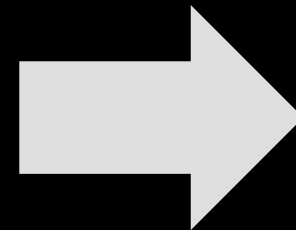
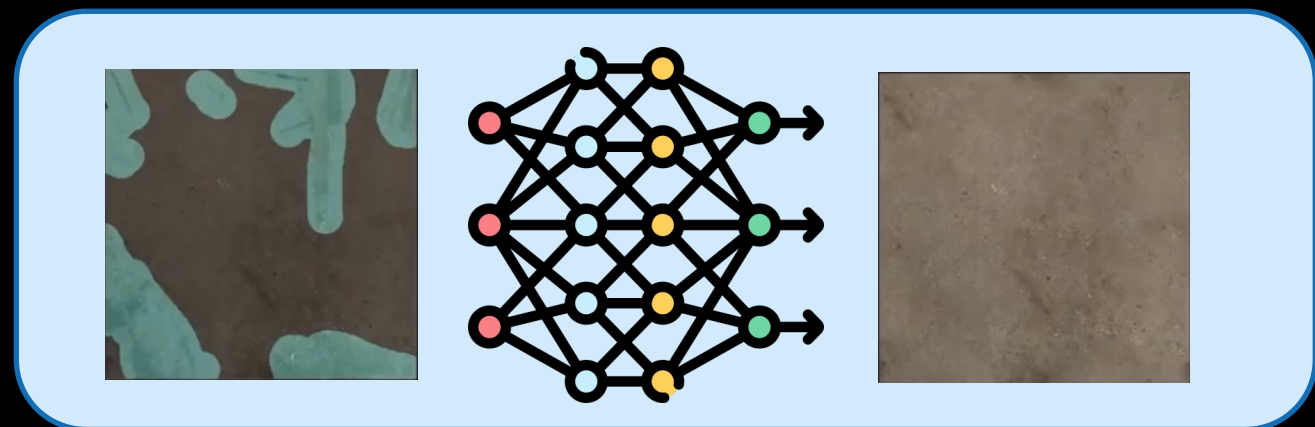
模型	发布时间	参数量	训练数据量	训练方式	上下文长度
GPT	2018年6月	1.17 亿	~ 5GB	无监督	512
GPT-2	2019年2月	15 亿	40GB	无监督	1K
GPT-3 (davinci)	2020年5月	1750 亿	45TB (过滤至~600GB)	无监督	2K
InstructGPT (based on GPT-3) (text-davinci-002)	2022年1月	1750 亿	增加标注数据： 13k条SFT 33k条RM	+有监督 +强化学习	4K
GPT-3.5 (text-davinci-003)	2022年11月	1750 亿	?	+有监督 +强化学习	4K
ChatGPT (based on GPT-3.5) (gpt-3.5-turbo)	2022年11月	1750 亿 or 百亿级 ?	?	+有监督 +强化学习	4K
GPT-4 (gpt-4, gpt-4-32k)	2023年3月	10000亿级 ?	?	+有监督 +强化学习	8K, 32K



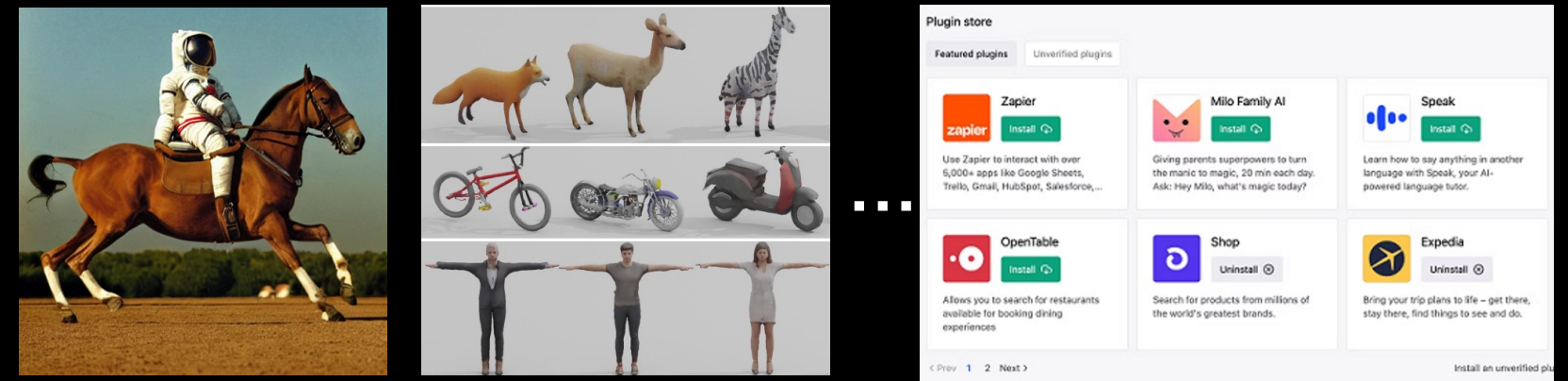
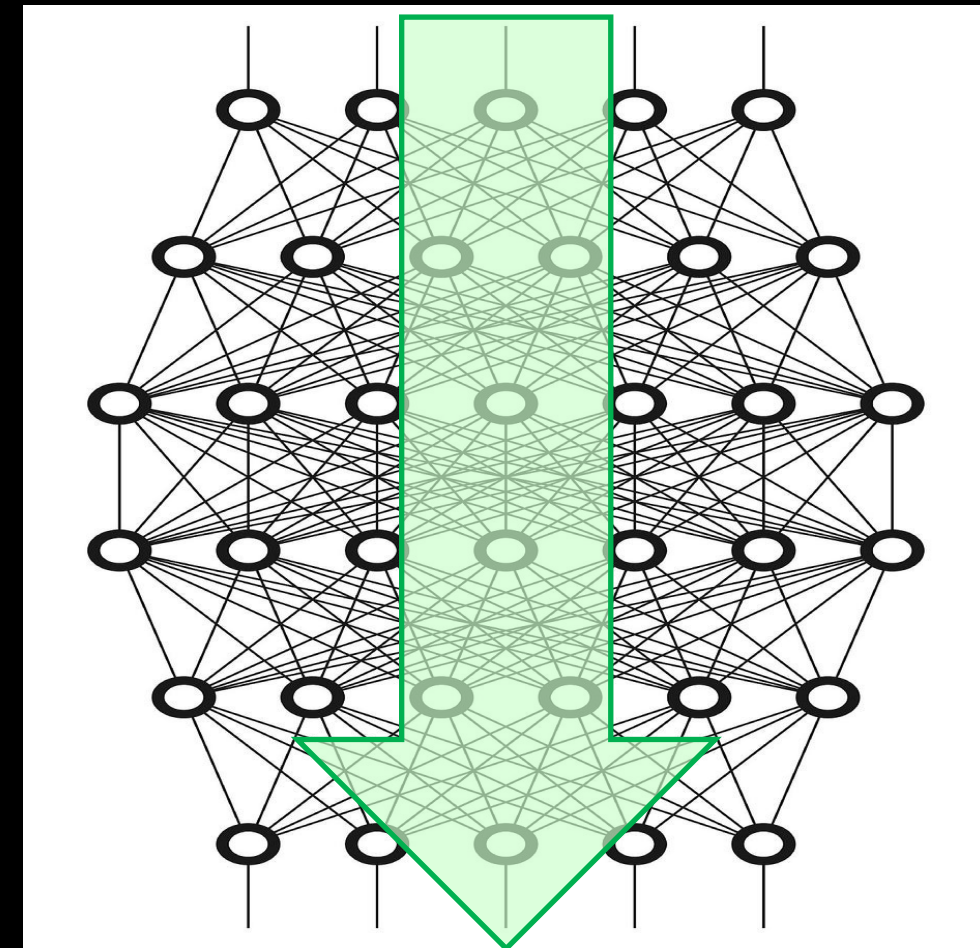
AI技术趋势：从“领域专用AI小模型”到“生成式AI大模型”



⋮

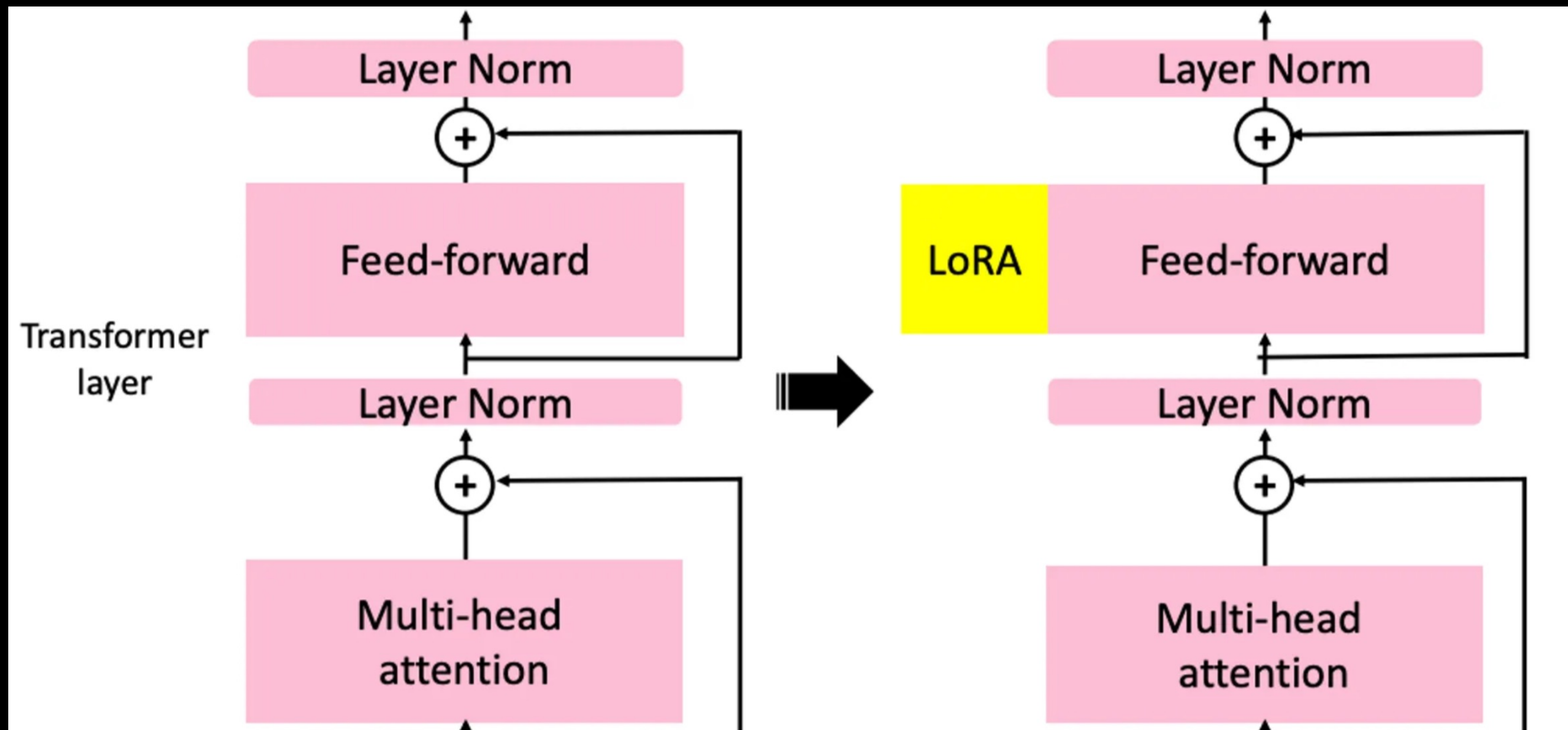


Text Prompts



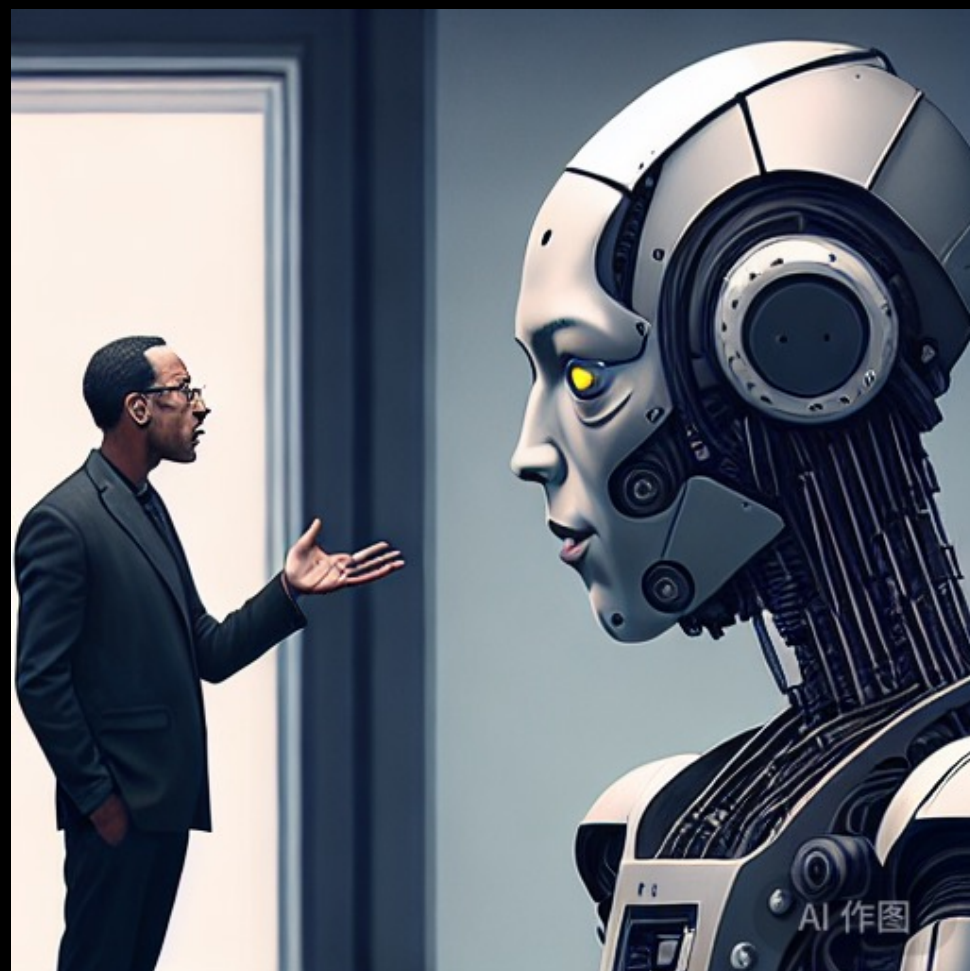


AI技术趋势：生成式AI大模型从“通用”再到“专用”



<https://d223302.github.io/AACL2022-Pretrain-Language-Model-Tutorial/>

生成式AI大模型：影响



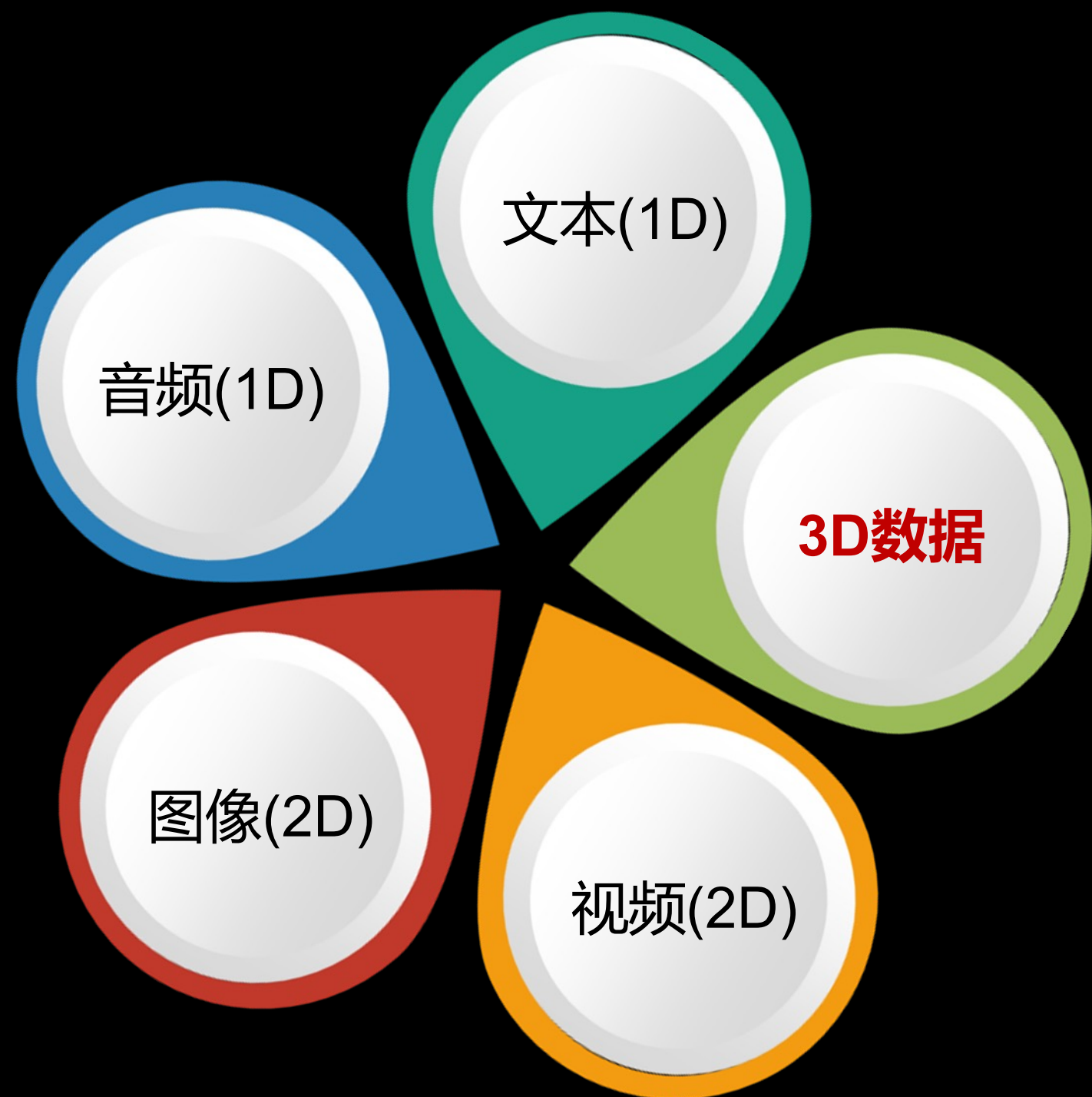
重塑人机交互方式



提升生产工具效率

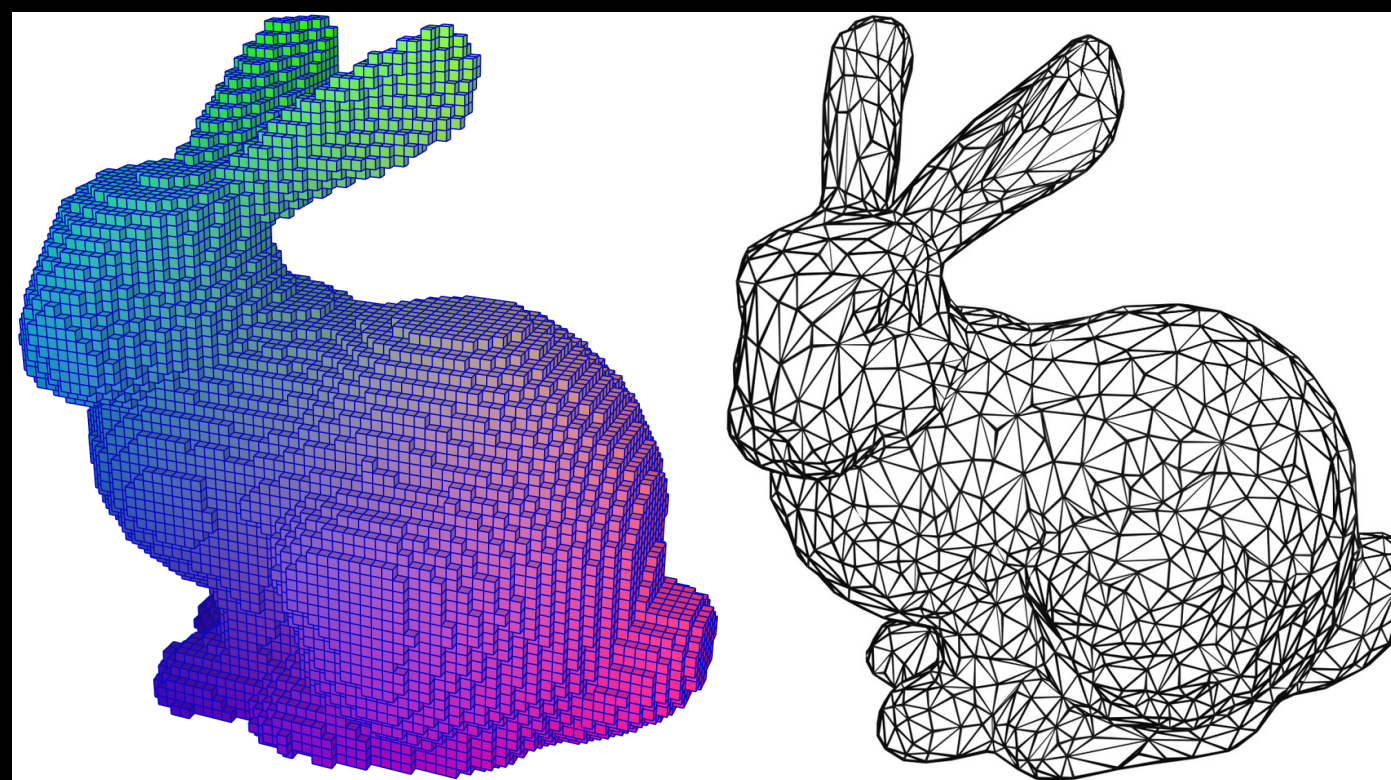


数据模态：从1D/2D到3D



• 3D数据的特点：

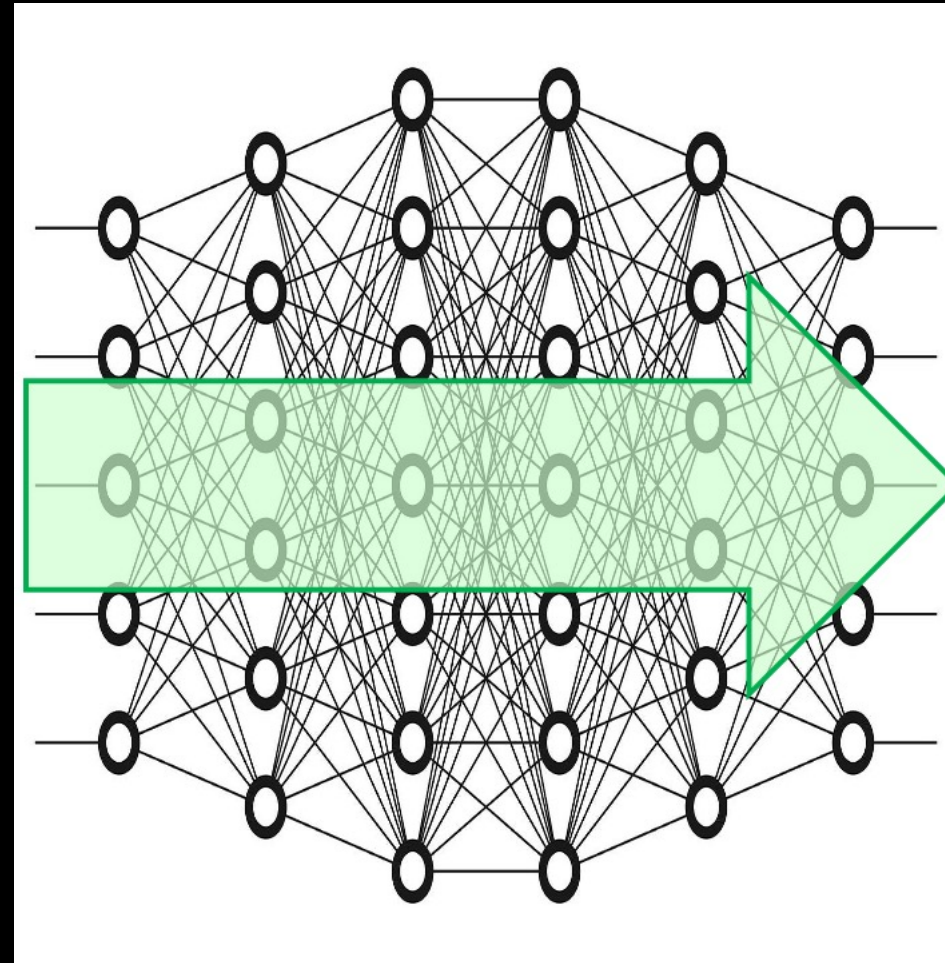
- 数据表示：体素、点云、 Mesh、 SDF、 隐式场等
- 呈现依赖：贴图、材质、 Shader、 光照、 动画、 VFX等
- 高质量数据的稀缺性



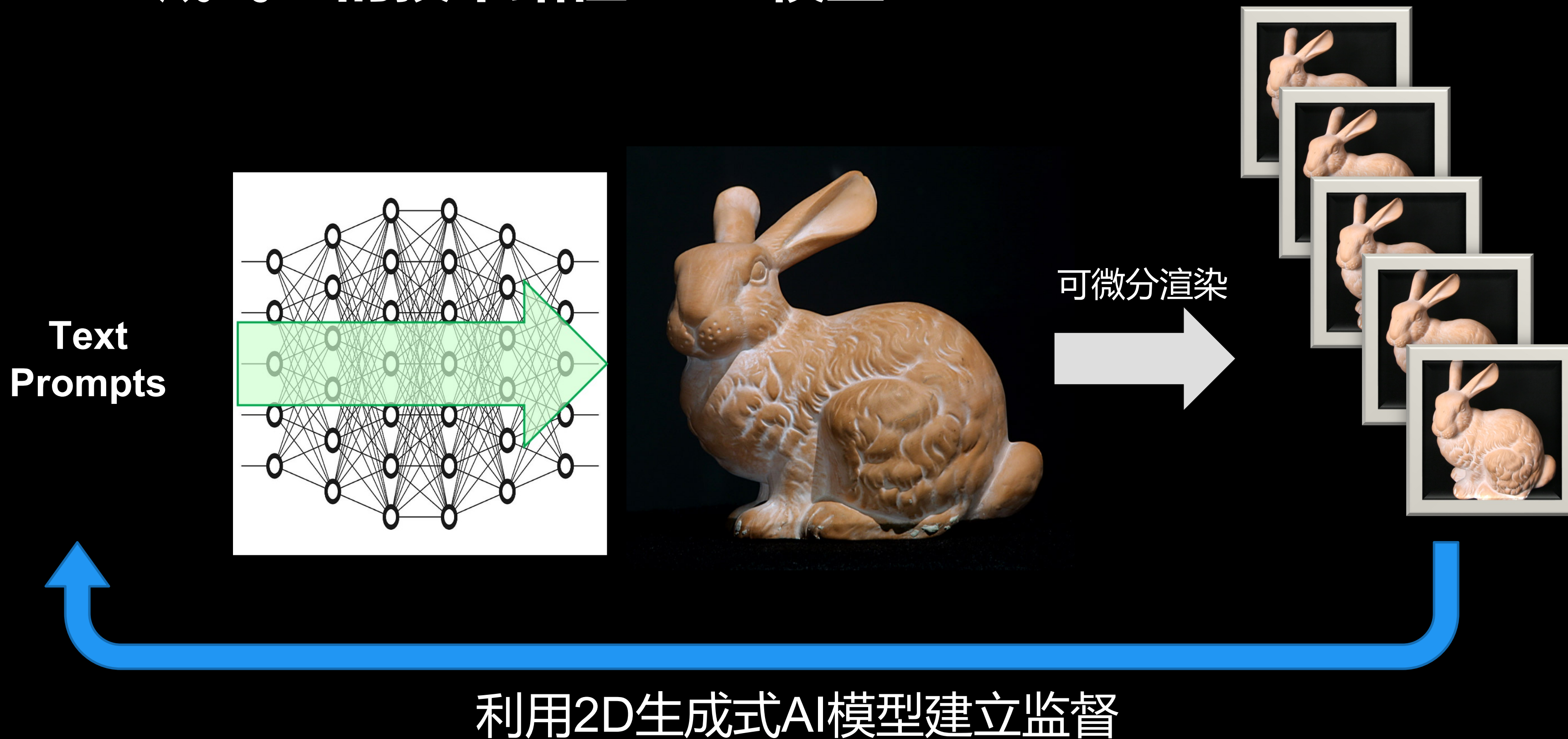


3D生成式AI的技术路径：3D模型

Text
Prompts



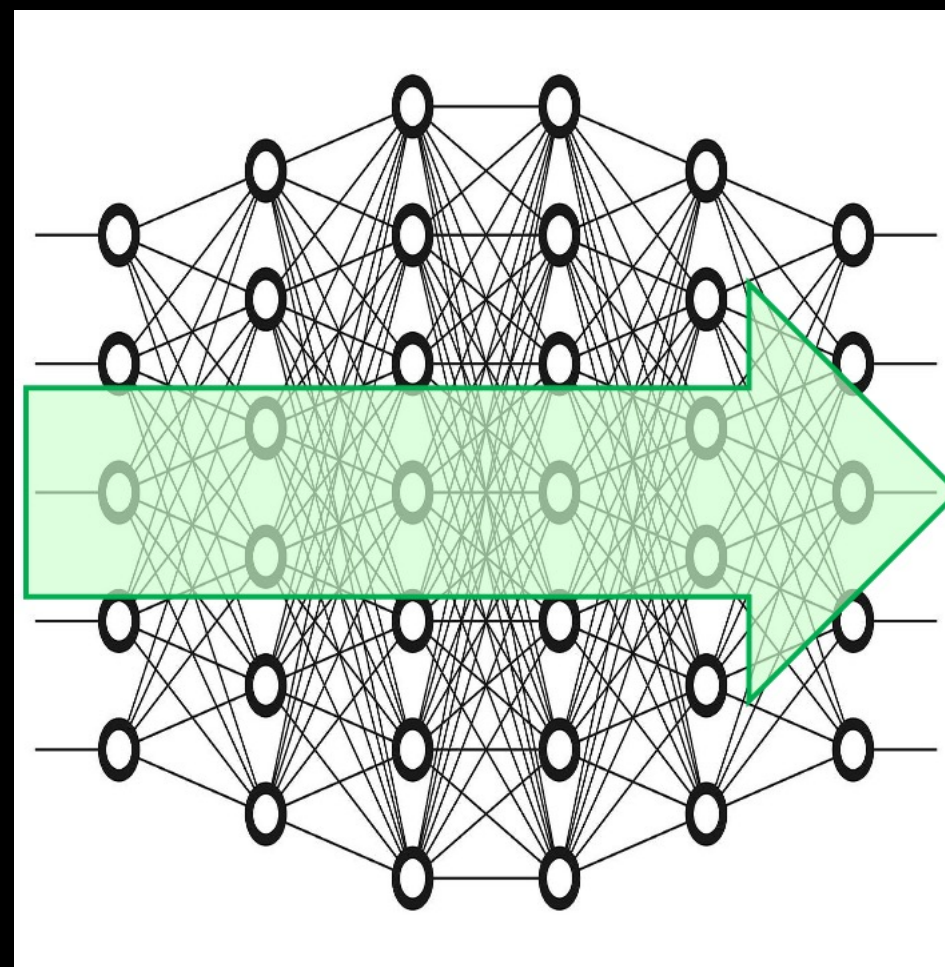
3D生成式AI的技术路径：3D模型





3D生成式AI的技术路径：材质及贴图

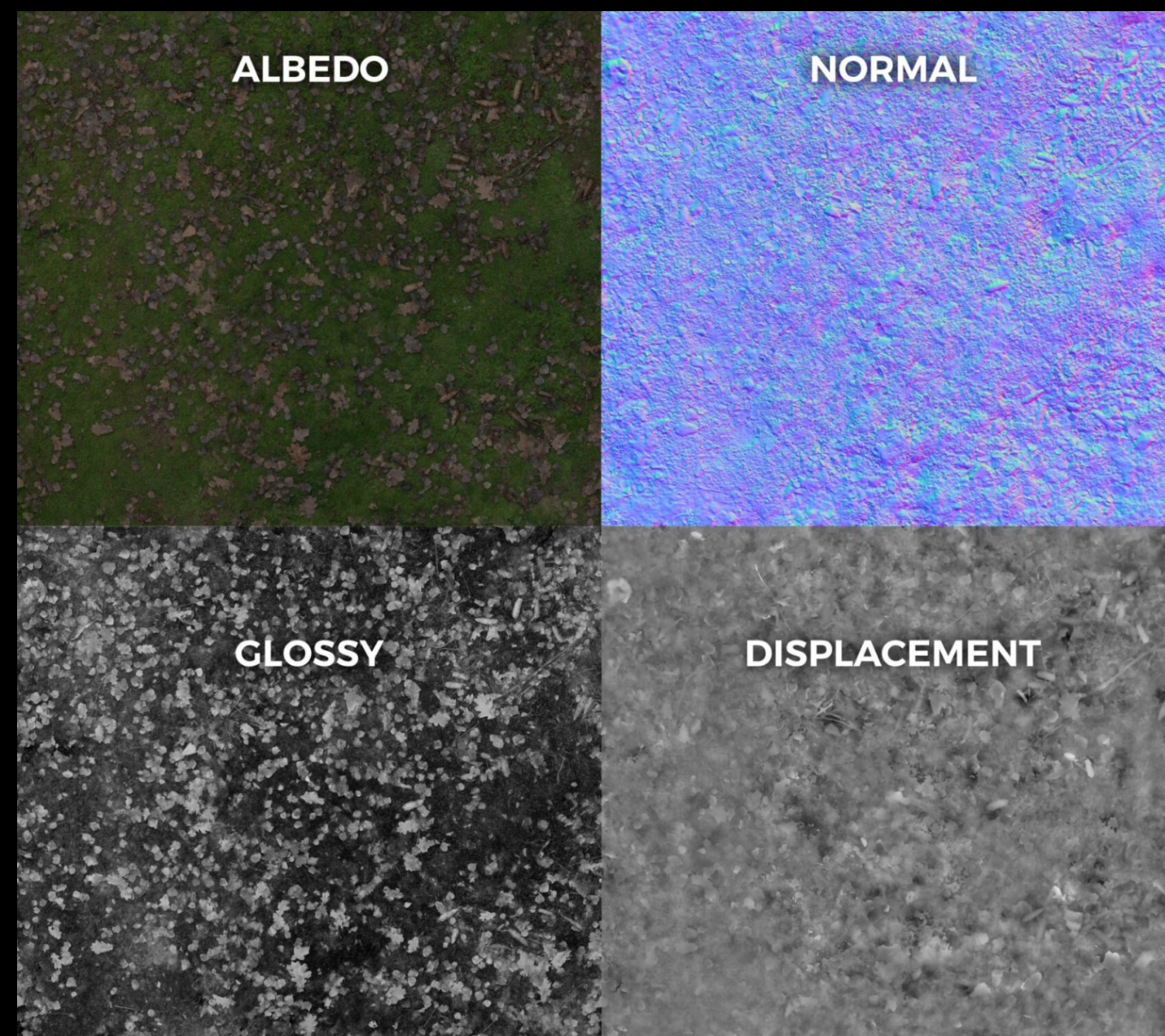
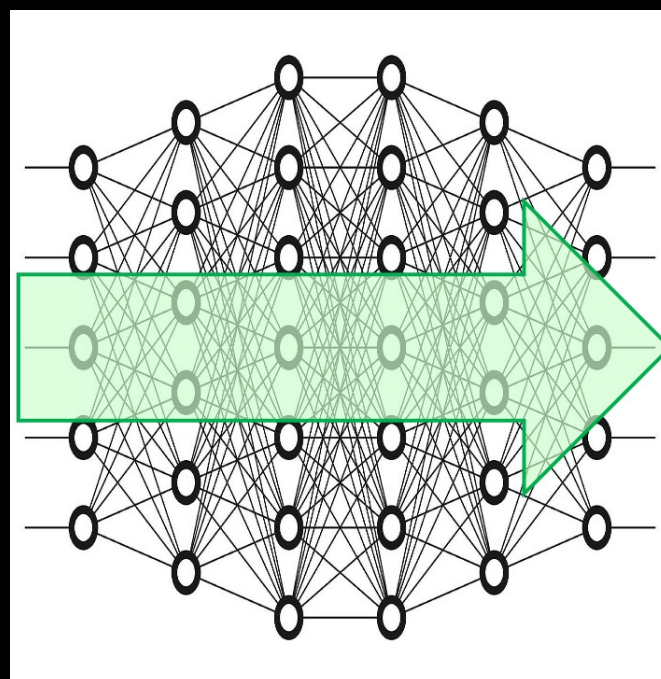
Text
Prompts





3D生成式AI的技术路径：材质及贴图

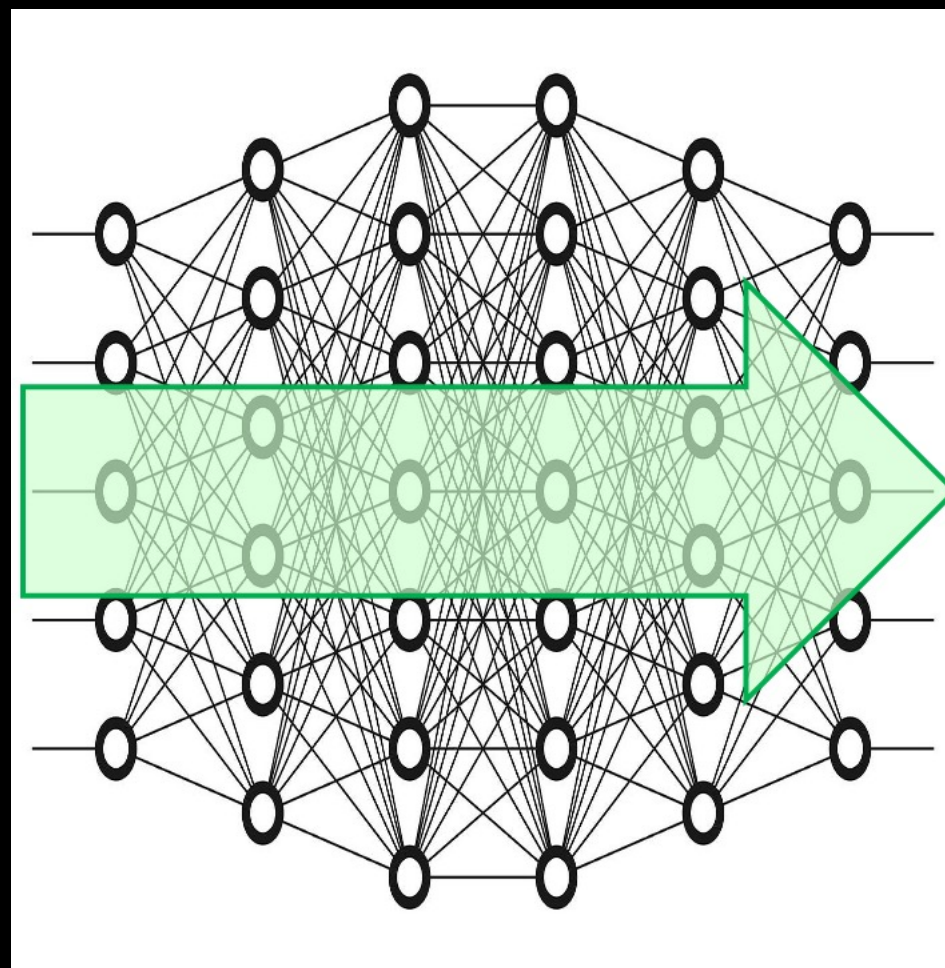
Text Prompts





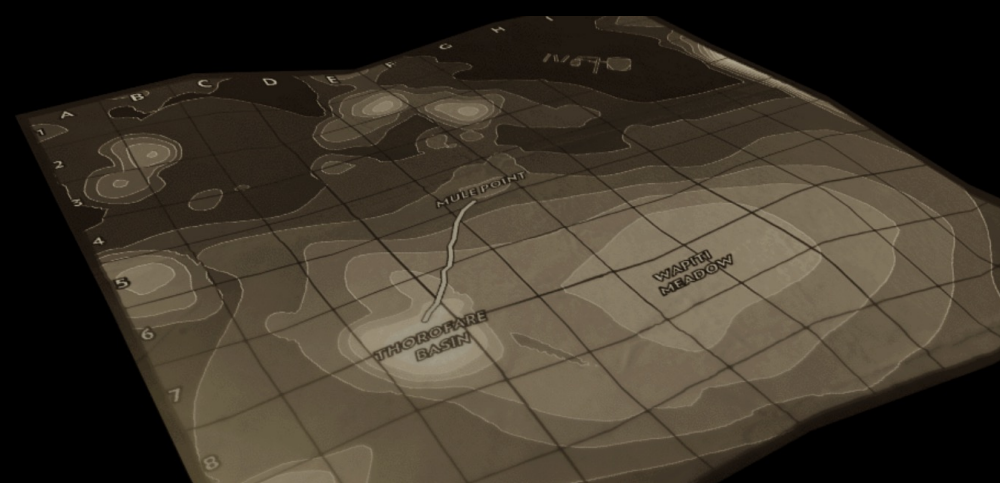
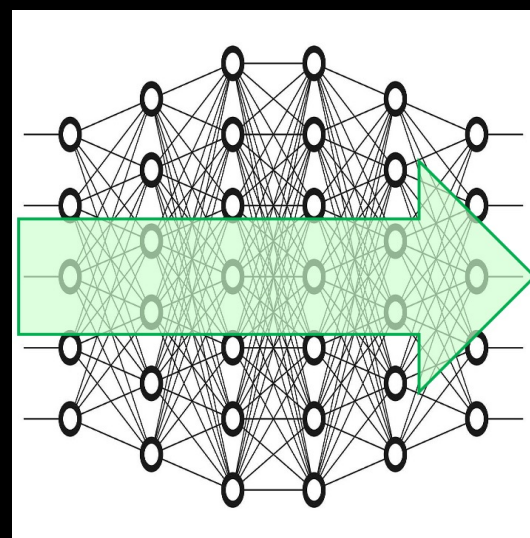
3D生成式AI的技术路径：3D场景

Text
Prompts

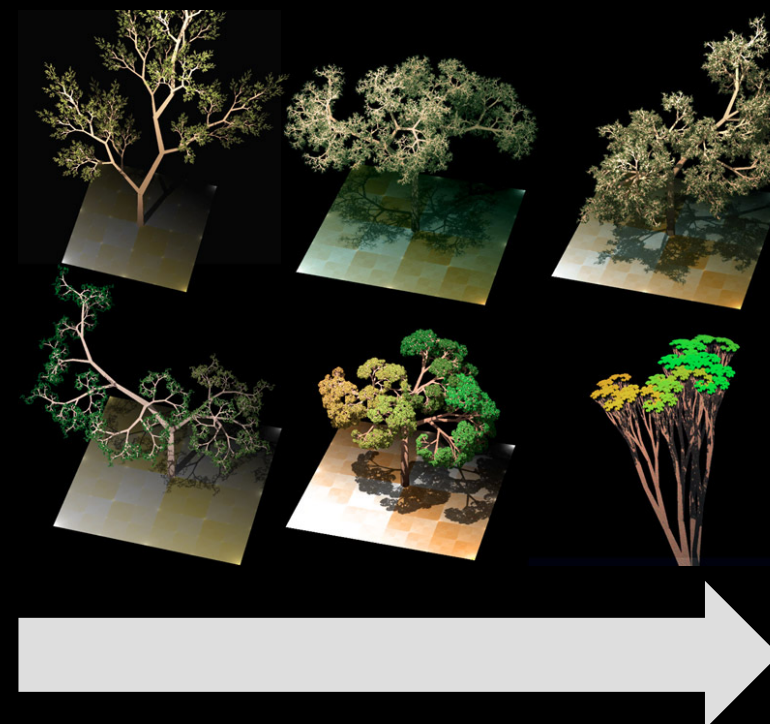


3D生成式AI的技术路径：3D场景

Text Prompts



场景布局及
组合规则等



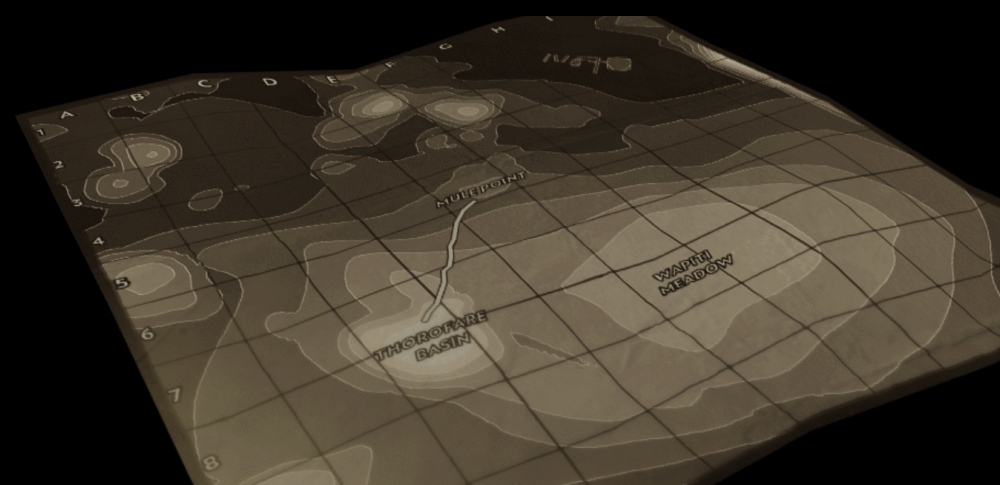
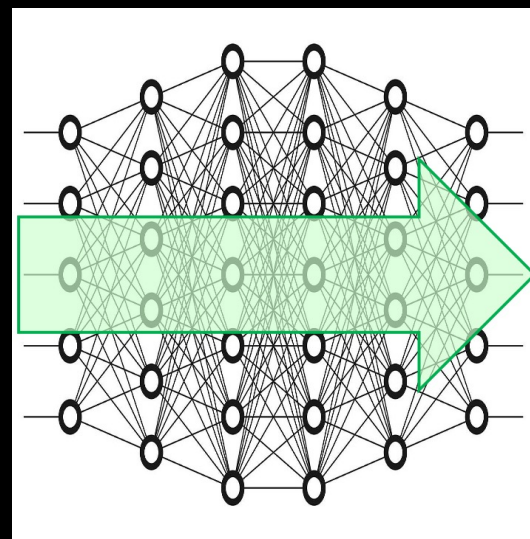
程序化生成
(PCG)



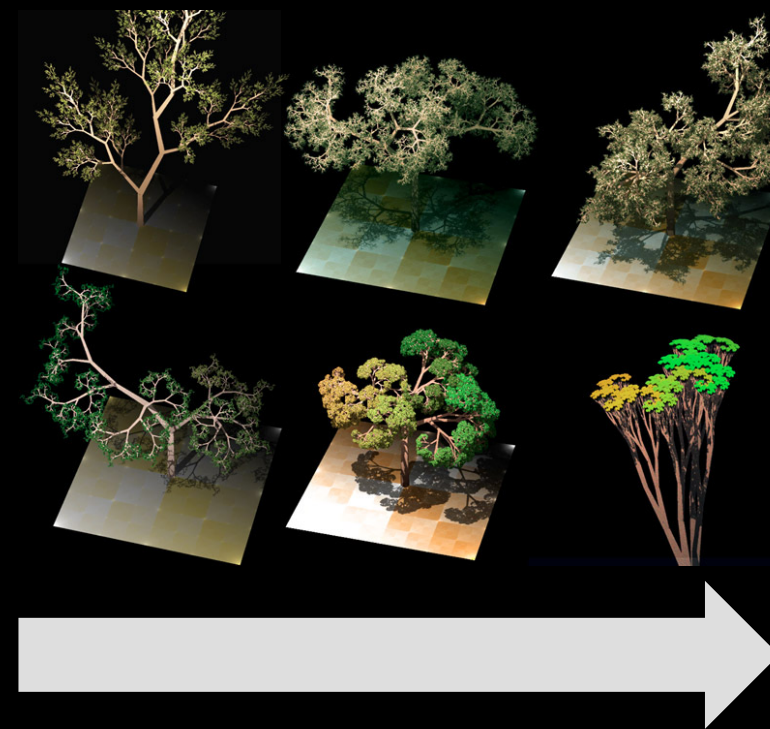


3D生成式AI的技术路径：3D场景

Text Prompts



场景布局及组合规则等



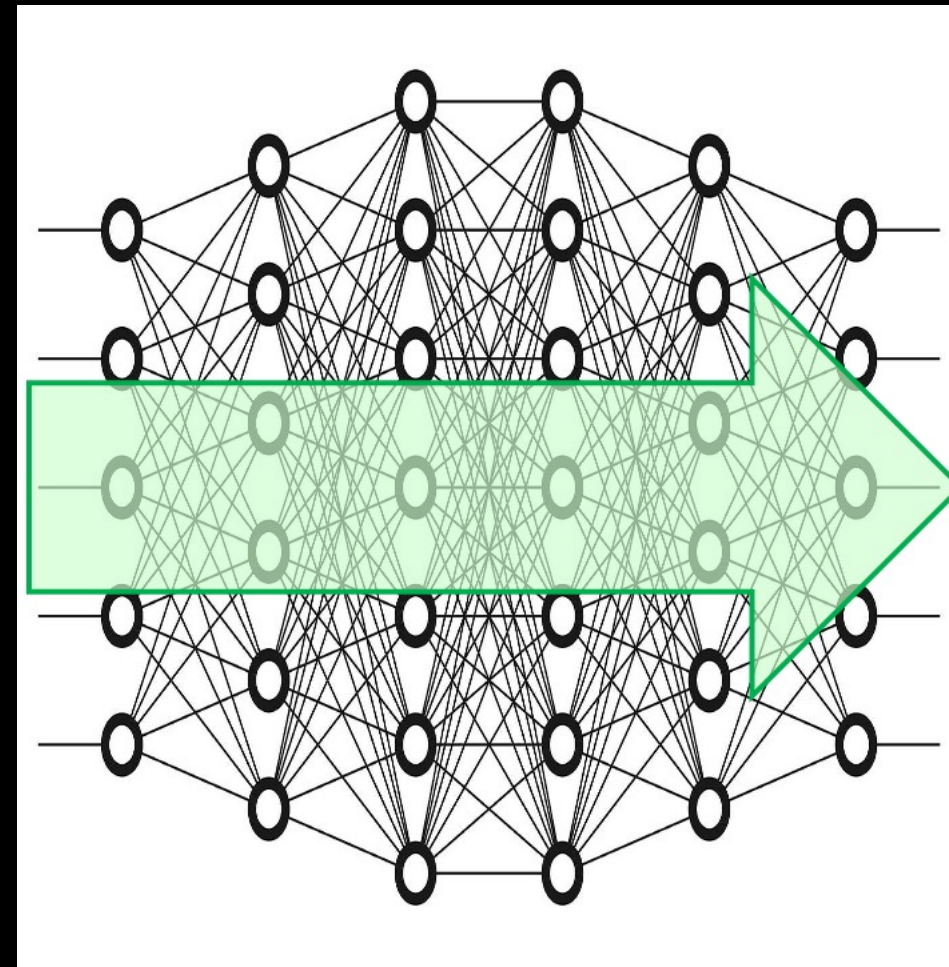
程序化生成 (PCG)





3D生成式AI的技术路径：3D虚拟人

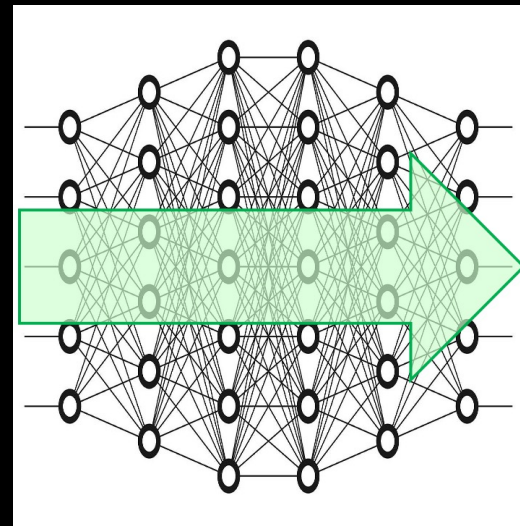
Text Prompts





3D生成式AI的技术路径：3D虚拟人

Text Prompts

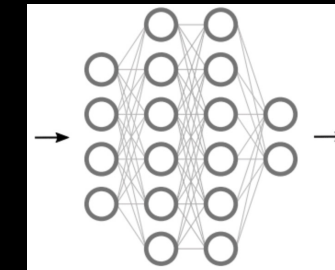
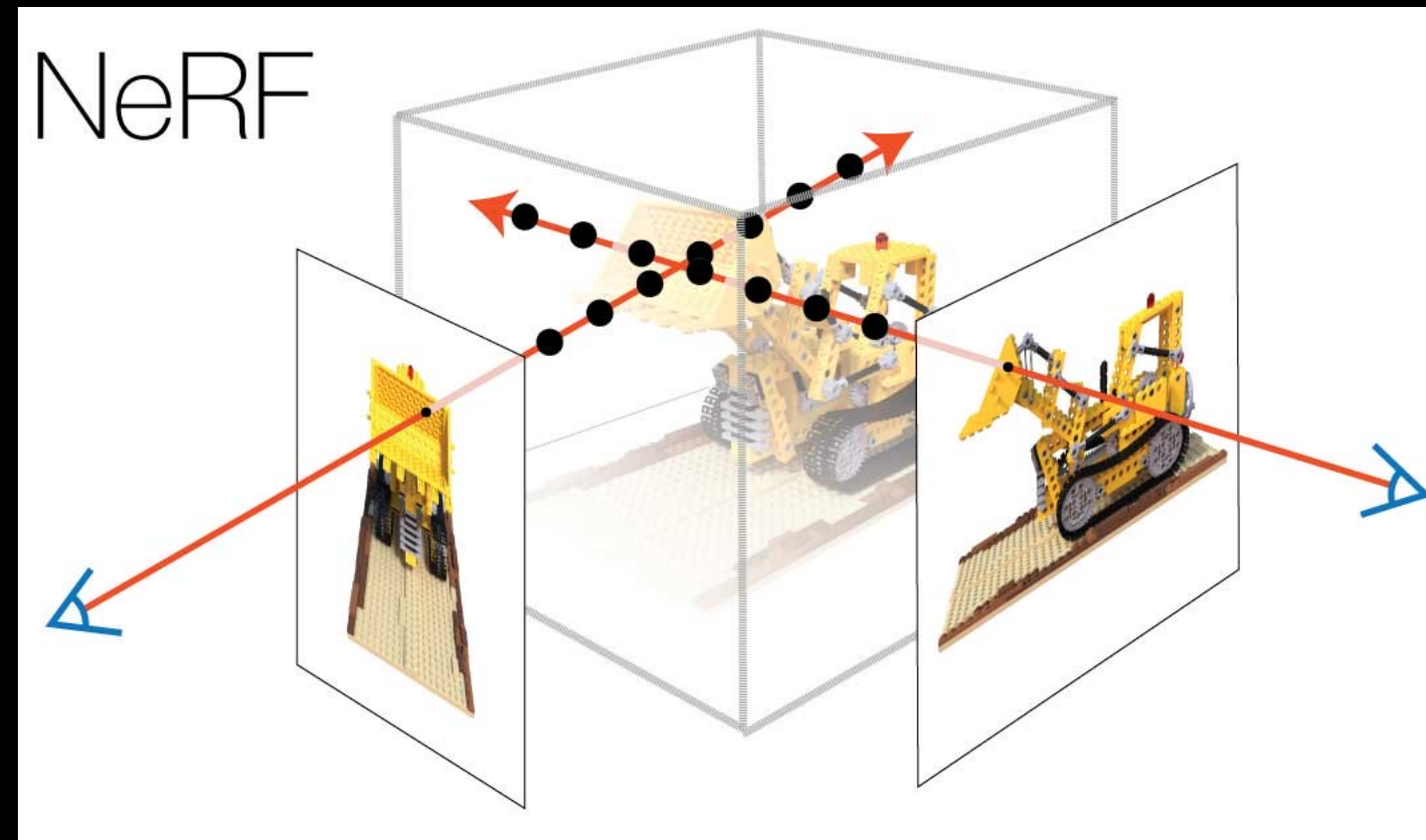
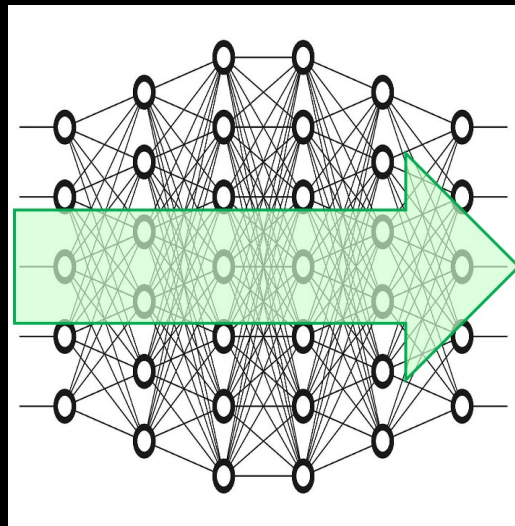


The central panel illustrates the technical pipeline for creating a 3D virtual human. It features four main components: 1) A realistic 3D rendered face of a woman. 2) A detailed facial rig control interface with various sliders and handles for facial expressions. 3) A blue skeletal rig representing the character's body structure. 4) A close-up of rendered hair, showing the texture and shading.

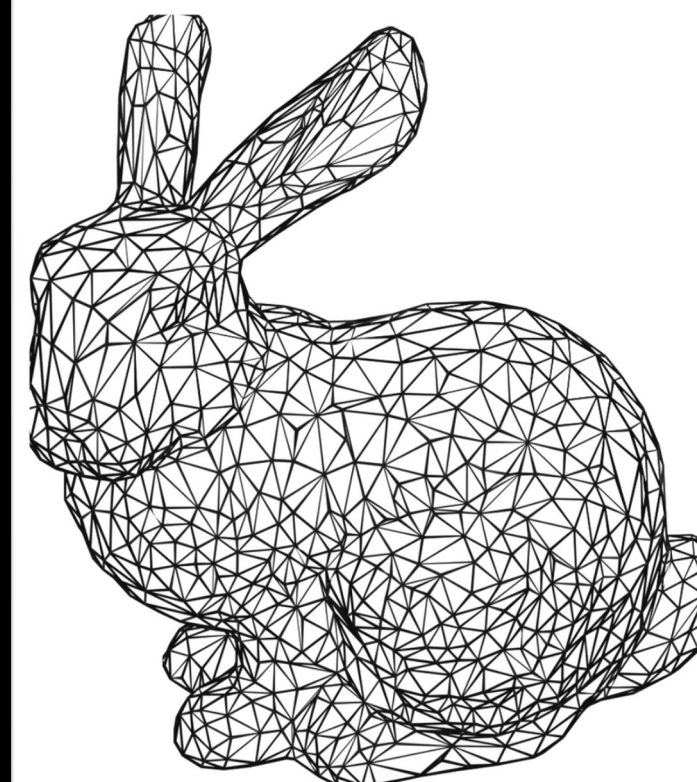


3D生成式AI的技术路径：隐式场及神经渲染

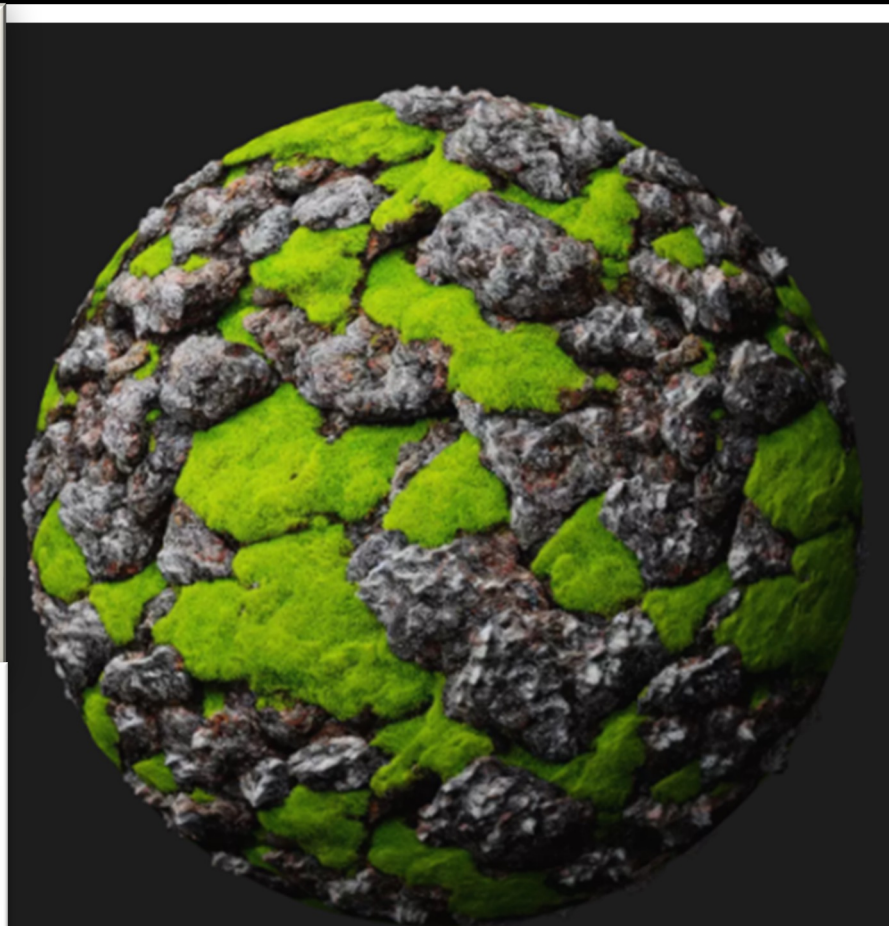
Text Prompts



3D生成式AI技术



模型生成



BariumAI

Text-to-Material Generator

BariumAI is now part of Unity

材质生成



场景程序化生成



虚拟人生成



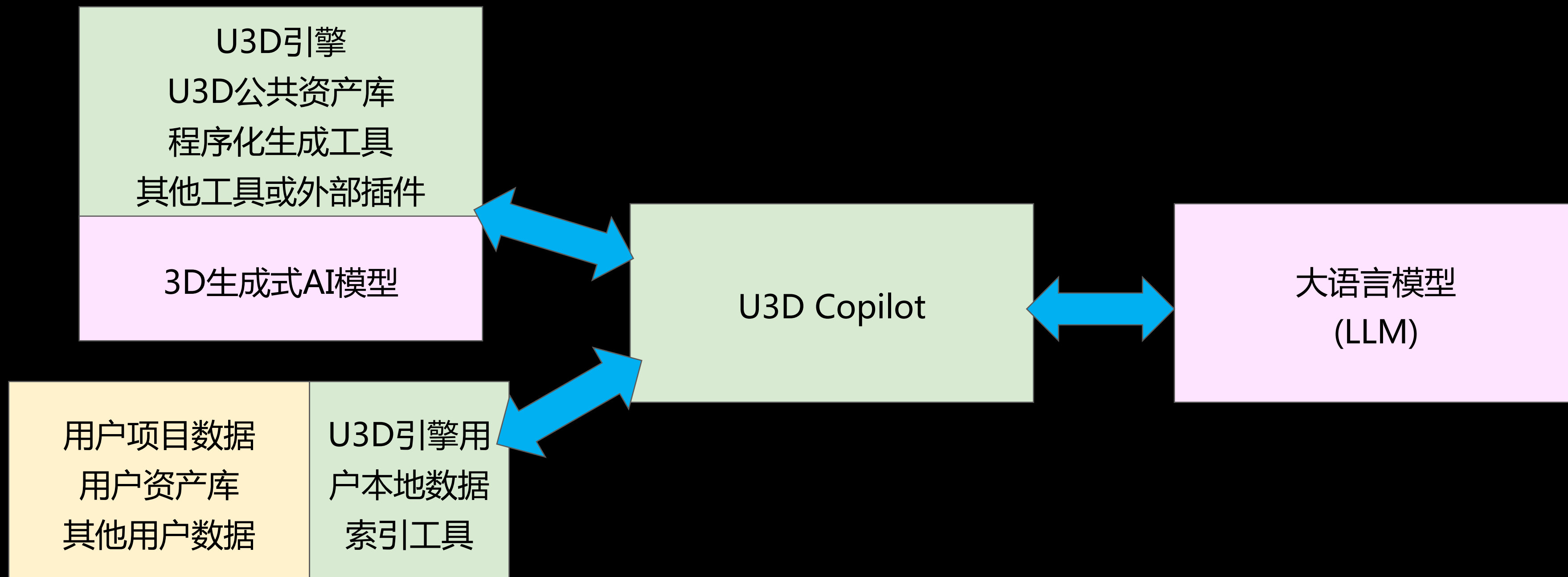
Unity中国版引擎的智能化



- 提升专业3D内容创作的效率
- 降低3D内容创作的门槛



Unity中国版引擎Copilot构想





AI对于我们的影响

- AI是为了提升开发者的效率
 - AI可以简化 workflow、自动化重复繁琐的操作
 - AI可以充分调动引擎更全面的能力
 - AI会出错，需要开发者的检查确认及修改
 - 使用好AI需要一定的技能，开发者之间的效率差异会更大
- 效率提升，解放更多创意
 - AI普及的时代，创意本身更有价值
 - 汽车代替马车之后，我们可以旅行的更远



THE END