DDPO lora VS base 生图效果对比

In [2]:
```
import torch
from diffusers import StableDiffusionPipeline, DDIMScheduler
import matplotlib.pyplot as plt

device = "cuda" if torch.cuda.is_available() else "mps" if torch.backends.mp
dtype = torch.float16 if device in ["cuda", "mps"] else torch.float32

print("device:", device, "dtype:", dtype)
```

```
/Users/shuoxu/Applications/anaconda3/envs/ddpo/lib/python3.10/site-packages/
tqdm/auto.py:21: TqdmWarning: IProgress not found. Please update jupyter and
ipywidgets. See https://ipywidgets.readthedocs.io/en/stable/user_install.htm
l
  from .autonotebook import tqdm as notebook_tqdm
/Users/shuoxu/Applications/anaconda3/envs/ddpo/lib/python3.10/site-packages/
accelerate/utils/torch_xla.py:18: UserWarning: pkg_resources is deprecated a
s an API. See https://setuptools.pypa.io/en/latest/pkg_resources.html. The p
kg_resources package is slated for removal as early as 2025-11-30. Refrain f
rom using this package or pin to Setuptools<81.
  import pkg_resources
device: mps dtype: torch.float16
```

In [3]:
```
base_model_id = "runwayml/stable-diffusion-v1-5"  # config.pretrained.model
ckpt_dir = "../logs/2026.01.05_07.54.36/checkpoints/checkpoint_3"
lora_weight_name = "pytorch_lora_weights.bin"
```

加载 base pipeline 不带LoRA，生成一张图

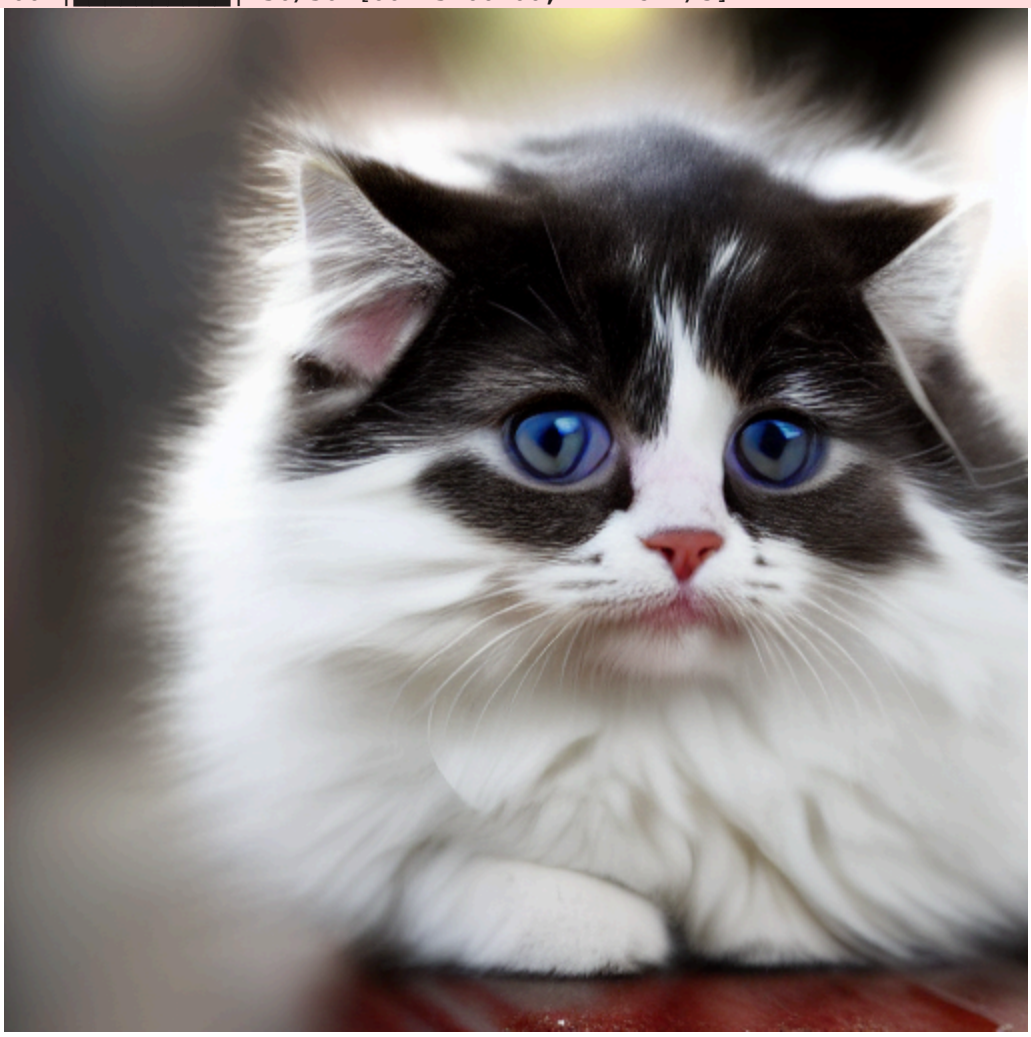
In [4]:
```
pipe_base = StableDiffusionPipeline.from_pretrained(
    base_model_id,
    torch_dtype=dtype,
    safety_checker=None,  # 可选
)
pipe_base.scheduler = DDIMScheduler.from_config(pipe_base.scheduler.config)
pipe_base.scheduler.eta = 1.0
pipe_base = pipe_base.to(device)

prompt = "a photo of a cute cat, high quality"
num_steps = 30
guidance = 7.5
seed = 12345

g = torch.Generator(device=device).manual_seed(seed)
img_base = pipe_base(prompt, num_inference_steps=num_steps, guidance_scale=g
img_base
```

```
/Users/shuoxu/Applications/anaconda3/envs/ddpo/lib/python3.10/site-packages/huggingface_hub/file_download.py:1142: FutureWarning: `resume_download` is deprecated and will be removed in version 1.0.0. Downloads always resume when possible. If you want to force a new download, use `force_download=True`.
  warnings.warn(
You have disabled the safety checker for <class 'diffusers.pipelines.stable_diffusion.pipeline_stable_diffusion.StableDiffusionPipeline'> by passing `safety_checker=None`. Ensure that you abide to the conditions of the Stable Diffusion license and do not expose unfiltered results in services or applications open to the public. Both the diffusers team and Hugging Face strongly recommend to keep the safety filter enabled in all public facing circumstances, disabling it only for use-cases that involve analyzing network behavior or auditing its results. For more information, please have a look at https://github.com/huggingface/diffusers/pull/254 .
100%|██████████| 30/30 [00:13<00:00,  2.29it/s]
```

Out[4]:



加载同一个 base pipeline + 注入 LoRA，再生成一张图

In [5]:

```python
pipe_lora = StableDiffusionPipeline.from_pretrained(
    base_model_id,
    torch_dtype=dtype,
    safety_checker=None,
)
pipe_lora.scheduler = DDIMScheduler.from_config(pipe_lora.scheduler.config)
pipe_lora.scheduler.eta = 1.0
```

```python
pipe_lora = pipe_lora.to(device)

# 关键：加载 checkpoint_3 里的 lora 权重
pipe_lora.load_lora_weights(ckpt_dir, weight_name=lora_weight_name)

# 可选：LoRA 强度（1.0 是默认）
# pipe_lora.set_adapters(["default"], adapter_weights=[1.0])  # 某些版本需要/支

g = torch.Generator(device=device).manual_seed(seed)
img_lora = pipe_lora(prompt, num_inference_steps=num_steps, guidance_scale=g
img_lora
```

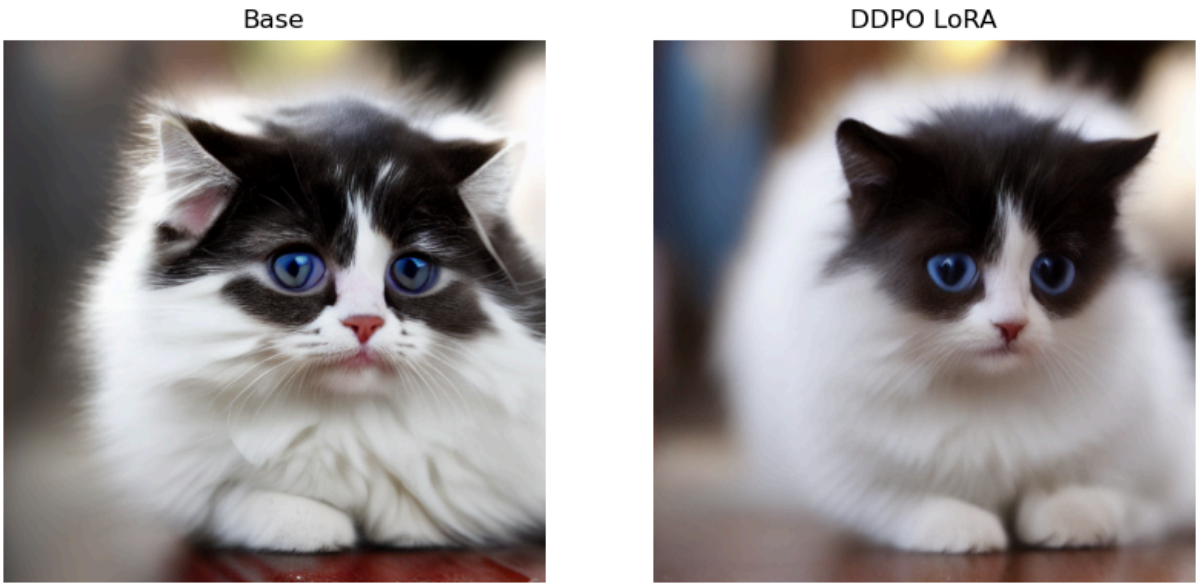
```
/Users/shuoxu/Applications/anaconda3/envs/ddpo/lib/python3.10/site-packages/
huggingface_hub/file_download.py:1142: FutureWarning: `resume_download` is d
eprecated and will be removed in version 1.0.0. Downloads always resume when
possible. If you want to force a new download, use `force_download=True`.
  warnings.warn(
You have disabled the safety checker for <class 'diffusers.pipelines.stable_
diffusion.pipeline_stable_diffusion.StableDiffusionPipeline'> by passing `sa
fety_checker=None`. Ensure that you abide to the conditions of the Stable Di
ffusion license and do not expose unfiltered results in services or applicat
ions open to the public. Both the diffusers team and Hugging Face strongly r
ecommend to keep the safety filter enabled in all public facing circumstance
s, disabling it only for use-cases that involve analyzing network behavior o
r auditing its results. For more information, please have a look at https://
github.com/huggingface/diffusers/pull/254 .
/Users/shuoxu/Applications/anaconda3/envs/ddpo/lib/python3.10/site-packages/
diffusers/loaders.py:957: UserWarning: You have saved the LoRA weights using
the old format. To convert the old LoRA weights to the new format, you can f
irst load them in a dictionary and then create a new dictionary like the fol
lowing: `new_state_dict = {f'unet'.{module_name}: params for module_name, pa
rams in old_state_dict.items()}`.
  warnings.warn(warn_message)
100%|██████████| 30/30 [00:13<00:00,  2.24it/s]
```

Out[5]:

并排对比显示

In [6]:

```
fig, axes = plt.subplots(1, 2, figsize=(10, 5))
axes[0].imshow(img_base); axes[0].set_title("Base"); axes[0].axis("off")
axes[1].imshow(img_lora); axes[1].set_title("DDPO LoRA"); axes[1].axis("off"
plt.show()
```



reward打分对比

In [7]:
```
from pathlib import Path
import sys


REPO_ROOT = Path.cwd().resolve().parent
print("REPO_ROOT =", REPO_ROOT)

# 确保可以 import ddpo_pytorch
if str(REPO_ROOT) not in sys.path:
    sys.path.insert(0, str(REPO_ROOT))
```

```
REPO_ROOT = /Users/shuoxu/Desktop/图灵学术/第3阶段：复现工作/2.DDPO复现工作/DDPO源代码/ddpo-pytorch
```

In [8]:
```
import ddpo_pytorch.rewards as rewards

# TODO: 这里填你训练用的 reward_fn 名字（和 config.reward_fn 一致）
# 常见例子： "jpeg_incompressibility", "jpeg_compressibility", "aesthetic_sco
REWARD_FN_NAME = "jpeg_incompressibility"

reward_factory = getattr(rewards, REWARD_FN_NAME)
reward_fn = reward_factory()  # 训练里就是 rewards.<name>() 得到可调用的 reward_

print("Loaded reward_fn =", REWARD_FN_NAME, "->", reward_fn)
```

```
Loaded reward_fn = jpeg_incompressibility -> <function jpeg_incompressibility.<locals>._fn at 0x37fbad1b0>
```

In [9]:
```
import torch
import numpy as np

def pil_to_nchw01(pil_img):
    """
    PIL.Image (H,W,3, uint8) -> torch.Tensor (1,3,H,W) float32 in [0,1]
    """
    arr = np.array(pil_img).astype(np.float32) / 255.0          # (H,W,3)
    t = torch.from_numpy(arr).permute(2, 0, 1).unsqueeze(0)     # (1,3,H,W)
    return t

# 1) PIL -> tensor batch
img_base_t = pil_to_nchw01(img_base)
img_lora_t = pil_to_nchw01(img_lora)

images_t = torch.cat([img_base_t, img_lora_t], dim=0)  # (2,3,H,W)

# 2) reward_fn 的 prompts / metadata 仍然照常传
prompts = [prompt, prompt]
metadata = [{}, {}]

# 3) 打分
scores, info = reward_fn(images_t, prompts, metadata)

# 4) 转成 float 打印
scores_list = torch.as_tensor(scores).detach().cpu().flatten().tolist()
```

```python
print(f"[Reward = {REWARD_FN_NAME}]")
print("Base score:", scores_list[0])
print("LoRA score:", scores_list[1])
print("Delta (LoRA - Base):", scores_list[1] - scores_list[0])

if isinstance(info, dict) and len(info) > 0:
    print("\n[info keys]", list(info.keys()))
```

```
[Reward = jpeg_incompressibility]
Base score: 74.006
LoRA score: 55.279
Delta (LoRA - Base): -18.726999999999997
```