```
%%html
<video controls autoplay><source src="https://huggingface.co/ThomasSimonini/ppo-SpaceInvadersNoFrameskip-v4/resolve/main/replay.mp4" type="vi
```

```
!pip install git+https://github.com/DLR-RM/rl-baselines3-zoo
```

```
Collecting nvidia-cusolver-cu12==11.6.1.9 (from torch<3.0,>=2.3->stable_baselines3<3.0,>=2.5.0->sb3_contrib<3.0,>=2.5.0->rl_zoo3==2.:
  Downloading nvidia_cusolver_cu12-11.6.1.9-py3-none-manylinux2014_x86_64.whl.metadata (1.6 kB)
Collecting nvidia-cusparse-cu12==12.3.1.170 (from torch<3.0,>=2.3->stable_baselines3<3.0,>=2.5.0->sb3_contrib<3.0,>=2.5.0->rl_zoo3==2
  Downloading nvidia_cusparse_cu12-12.3.1.170-py3-none-manylinux2014_x86_64.whl.metadata (1.6 kB)
Requirement already satisfied: nvidia-nccl-cu12==2.21.5 in /usr/local/lib/python3.11/dist-packages (from torch<3.0,>=2.3->stable_base
Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch<3.0,>=2.3->stable_ba
Collecting nvidia-nvjitlink-cu12==12.4.127 (from torch<3.0,>=2.3->stable_baselines3<3.0,>=2.5.0->sb3_contrib<3.0,>=2.5.0->rl_zoo3==2
  Downloading nvidia_nvjitlink_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl.metadata (1.5 kB)
Requirement already satisfied: triton==3.1.0 in /usr/local/lib/python3.11/dist-packages (from torch<3.0,>=2.3->stable_baselines3<3.0,
Requirement already satisfied: sympy==1.13.1 in /usr/local/lib/python3.11/dist-packages (from torch<3.0,>=2.3->stable_baselines3<3.0,
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.11/dist-packages (from sympy==1.13.1->torch<3.0,>=2.3->st
Requirement already satisfied: MarkupSafe>=0.9.2 in /usr/local/lib/python3.11/dist-packages (from Mako->alembic>=1.5.0->optuna>=3.0->
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.11/dist-packages (from matplotlib->stable_baselines3<3.0,>=
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.11/dist-packages (from matplotlib->stable_baselines3<3.0,>=2.5
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.11/dist-packages (from matplotlib->stable_baselines3<3.0,>
Requirement already satisfied: kiwisolver>=1.3.1 in /usr/local/lib/python3.11/dist-packages (from matplotlib->stable_baselines3<3.0,>
Requirement already satisfied: pillow>=8 in /usr/local/lib/python3.11/dist-packages (from matplotlib->stable_baselines3<3.0,>=2.5.0->
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.11/dist-packages (from matplotlib->stable_baselines3<3.0,>=
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/dist-packages (from pandas->stable_baselines3<3.0,>=2.5.0-
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface-hub~=0
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface-hub~=0.8->huggingf
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface-hub~=0.8->hu
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages (from requests->huggingface-hub~=0.8->hu
Downloading huggingface_sb3-3.0-py3-none-any.whl (9.7 kB)
Downloading optuna-4.2.1-py3-none-any.whl (383 kB)
                                              383.6/383.6 kB 13.0 MB/s eta 0:00:00
Downloading pytablewriter-1.2.1-py3-none-any.whl (91 kB)
                                              91.1/91.1 kB 7.1 MB/s eta 0:00:00
Downloading sb3_contrib-2.5.0-py3-none-any.whl (92 kB)
                                              92.8/92.8 kB 8.3 MB/s eta 0:00:00
Downloading Shimmy-2.0.0-py3-none-any.whl (30 kB)
Downloading alembic-1.14.1-py3-none-any.whl (233 kB)
                                              233.6/233.6 kB 22.9 MB/s eta 0:00:00
Downloading DataProperty-1.1.0-py3-none-any.whl (27 kB)
Downloading mbstrdecoder-1.1.4-py3-none-any.whl (7.9 kB)
Downloading pathvalidate-3.2.3-py3-none-any.whl (24 kB)
Downloading stable_baselines3-2.5.0-py3-none-any.whl (183 kB)
                                              183.9/183.9 kB 17.4 MB/s eta 0:00:00
Downloading tabledata-1.3.4-py3-none-any.whl (11 kB)
Downloading tcolorpy-0.1.7-py3-none-any.whl (8.1 kB)
Downloading typepy-1.3.4-py3-none-any.whl (31 kB)
Downloading colorlog-6.9.0-py3-none-any.whl (11 kB)
Downloading nvidia_cublas_cu12-12.4.5.8-py3-none-manylinux2014_x86_64.whl (363.4 MB)
                                              363.4/363.4 MB 1.4 MB/s eta 0:00:00
Downloading nvidia_cuda_cupti_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl (13.8 MB)
                                              13.8/13.8 MB 106.2 MB/s eta 0:00:00
Downloading nvidia_cuda_nvrtc_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl (24.6 MB)
                                              24.6/24.6 MB 86.7 MB/s eta 0:00:00
Downloading nvidia_cuda_runtime_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl (883 kB)
                                              883.7/883.7 kB 60.6 MB/s eta 0:00:00
Downloading nvidia_cudnn_cu12-9.1.0.70-py3-none-manylinux2014_x86_64.whl (664.8 MB)
                                              664.8/664.8 MB 1.6 MB/s eta 0:00:00
Downloading nvidia_cufft_cu12-11.2.1.3-py3-none-manylinux2014_x86_64.whl (211.5 MB)
                                              211.5/211.5 MB 5.7 MB/s eta 0:00:00
Downloading nvidia_curand_cu12-10.3.5.147-py3-none-manylinux2014_x86_64.whl (56.3 MB)
                                              56.3/56.3 MB 12.7 MB/s eta 0:00:00
Downloading nvidia_cusolver_cu12-11.6.1.9-py3-none-manylinux2014_x86_64.whl (127.9 MB)
                                              127.9/127.9 MB 8.3 MB/s eta 0:00:00
```

```
!apt-get install swig cmake ffmpeg
```

```
Reading package lists... Done
Building dependency tree... Done
```

```
Reading state information... Done
cmake is already the newest version (3.22.1-1ubuntu1.22.04.2).
ffmpeg is already the newest version (7:4.4.2-0ubuntu0.22.04.1).
The following additional packages will be installed:
  swig4.0
Suggested packages:
  swig-doc swig-examples swig4.0-examples swig4.0-doc
The following NEW packages will be installed:
  swig swig4.0
0 upgraded, 2 newly installed, 0 to remove and 20 not upgraded.
Need to get 1,116 kB of archives.
After this operation, 5,542 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu jammy/universe amd64 swig4.0 amd64 4.0.2-1ubuntu1 [1,110 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy/universe amd64 swig all 4.0.2-1ubuntu1 [5,632 B]
Fetched 1,116 kB in 1s (769 kB/s)
Selecting previously unselected package swig4.0.
(Reading database ... 124926 files and directories currently installed.)
Preparing to unpack .../swig4.0_4.0.2-1ubuntu1_amd64.deb ...
Unpacking swig4.0 (4.0.2-1ubuntu1) ...
Selecting previously unselected package swig.
Preparing to unpack .../swig_4.0.2-1ubuntu1_all.deb ...
Unpacking swig (4.0.2-1ubuntu1) ...
Setting up swig4.0 (4.0.2-1ubuntu1) ...
Setting up swig (4.0.2-1ubuntu1) ...
Processing triggers for man-db (2.10.2-1) ...
```

To be able to use Atari games in Gymnasium we need to install atari package. And accept-rom-license to download the rom files (games files).

```
!pip install gymnasium[atari]
!pip install gymnasium[accept-rom-license]
```

```
Requirement already satisfied: gymnasium[atari] in /usr/local/lib/python3.11/dist-packages (1.0.0)
Requirement already satisfied: numpy>=1.21.0 in /usr/local/lib/python3.11/dist-packages (from gymnasium[atari]) (1.26.4)
Requirement already satisfied: cloudpickle>=1.2.0 in /usr/local/lib/python3.11/dist-packages (from gymnasium[atari]) (3.1.1)
Requirement already satisfied: typing-extensions>=4.3.0 in /usr/local/lib/python3.11/dist-packages (from gymnasium[atari]) (4.12.2)
Requirement already satisfied: farama-notifications>=0.0.1 in /usr/local/lib/python3.11/dist-packages (from gymnasium[atari]) (0.0.4)
Requirement already satisfied: ale-py>=0.9 in /usr/local/lib/python3.11/dist-packages (from gymnasium[atari]) (0.10.1)
Requirement already satisfied: gymnasium[accept-rom-license] in /usr/local/lib/python3.11/dist-packages (1.0.0)
WARNING: gymnasium 1.0.0 does not provide the extra 'accept-rom-license'
Requirement already satisfied: numpy>=1.21.0 in /usr/local/lib/python3.11/dist-packages (from gymnasium[accept-rom-license]) (1.26.4)
Requirement already satisfied: cloudpickle>=1.2.0 in /usr/local/lib/python3.11/dist-packages (from gymnasium[accept-rom-license]) (3.1.1
Requirement already satisfied: typing-extensions>=4.3.0 in /usr/local/lib/python3.11/dist-packages (from gymnasium[accept-rom-license])
Requirement already satisfied: farama-notifications>=0.0.1 in /usr/local/lib/python3.11/dist-packages (from gymnasium[accept-rom-license
```

```
%%capture
!apt install python-opengl
!apt install xvfb
!pip3 install pyvirtualdisplay
```

```
# Virtual display
from pyvirtualdisplay import Display

virtual_display = Display(visible=0, size=(1400, 900))
virtual_display.start()
```

```
<pyvirtualdisplay.display.Display at 0x7a06ba974a50>
```

```
!python -m rl_zoo3.train --algo _____ --env SpaceInvadersNoFrameskip-v4 -f _____ -c _____
```

```
2025-02-16 20:59:08.734055: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:477] Unable to register cuFFT factory: Attempting
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1739739548.996730    5290 cuda_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDN
E0000 00:00:1739739549.061884    5290 cuda_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cu
2025-02-16 20:59:09.595380: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available CP
To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
usage: train.py [-h] [--algo {a2c,ddpg,dqn,ppo,sac,td3,ars,crossq,qrdqn,tqc,trpo,ppo_lstm}]
                [--env ENV] [-tb TENSORBOARD_LOG] [-i TRAINED_AGENT]
                [--truncate-last-trajectory TRUNCATE_LAST_TRAJECTORY] [-n N_TIMESTEPS]
                [--num-threads NUM_THREADS] [--log-interval LOG_INTERVAL] [--eval-freq EVAL_FREQ]
                [--optimization-log-path OPTIMIZATION_LOG_PATH] [--eval-episodes EVAL_EPISODES]
                [--n-eval-envs N_EVAL_ENVS] [--save-freq SAVE_FREQ] [--save-replay-buffer]
                [-f LOG_FOLDER] [--seed SEED] [--vec-env {dummy,subproc}] [--device DEVICE]
                [--n-trials N_TRIALS] [--max-total-trials MAX_TOTAL_TRIALS] [-optimize]
                [--no-optim-plots] [--n-jobs N_JOBS] [--sampler {random,tpe,skopt}]
                [--pruner {halving,median,none}] [--n-startup-trials N_STARTUP_TRIALS]
                [--n-evaluations N_EVALUATIONS] [--storage STORAGE] [--study-name STUDY_NAME]
```

```
                    [--verbose VERBOSE] [--gym-packages GYM_PACKAGES [GYM_PACKAGES ...]]
                    [--env-kwargs ENV_KWARGS [ENV_KWARGS ...]]
                    [--eval-env-kwargs EVAL_ENV_KWARGS [EVAL_ENV_KWARGS ...]]
                    [-params HYPERPARAMS [HYPERPARAMS ...]] [-conf CONF_FILE] [-uuid] [--track]
                    [--wandb-project-name WANDB_PROJECT_NAME] [--wandb-entity WANDB_ENTITY] [-P]
                    [-tags WANDB_TAGS [WANDB_TAGS ...]]
         train.py: error: argument --algo: invalid choice: '_____' (choose from 'a2c', 'ddpg', 'dqn', 'ppo', 'sac', 'td3', 'ars', 'crossq', 'q
```

Solution

`!python -m rl_zoo3.train --algo dqn  --env SpaceInvadersNoFrameskip-v4 -f logs/ -c atari-dqn.yml`

```
|     ep_rew_mean     | 336      |
|     exploration_rate | 0.01    |
| time/               |          |
|     episodes        | 1924     |
|     fps             | 290      |
|     time_elapsed    | 1364     |
|     total_timesteps | 396283   |
| train/              |          |
|     learning_rate   | 0.0003   |
|     loss            | 0.0198   |
|     n_updates       | 74070    |
-------------------------------
-------------------------------
| rollout/            |          |
|     ep_len_mean     | 3.07e+03 |
|     ep_rew_mean     | 339      |
|     exploration_rate | 0.01    |
| time/               |          |
|     episodes        | 1928     |
|     fps             | 290      |
|     time_elapsed    | 1369     |
|     total_timesteps | 397470   |
| train/              |          |
|     learning_rate   | 0.0003   |
|     loss            | 0.0211   |
|     n_updates       | 74367    |
-------------------------------
-------------------------------
| rollout/            |          |
|     ep_len_mean     | 3.07e+03 |
|     ep_rew_mean     | 343      |
|     exploration_rate | 0.01    |
| time/               |          |
|     episodes        | 1932     |
|     fps             | 290      |
|     time_elapsed    | 1373     |
|     total_timesteps | 398736   |
| train/              |          |
|     learning_rate   | 0.0003   |
|     loss            | 0.0495   |
|     n_updates       | 74683    |
-------------------------------
Eval num_timesteps=400000, episode_reward=348.00 +/- 59.38
Episode length: 3118.80 +/- 240.24
-------------------------------
| eval/               |          |
|     mean_ep_length  | 3.12e+03 |
|     mean_reward     | 348      |
| rollout/            |          |
|     exploration_rate | 0.01    |
| time/               |          |
|     total_timesteps | 400000   |
| train/              |          |
|     learning_rate   | 0.0003   |
|     loss            | 0.0327   |
|     n_updates       | 74999    |
-------------------------------
Saving to logs//dqn/SpaceInvadersNoFrameskip-v4_4
```

`!python -m rl_zoo3.enjoy  --algo dqn  --env SpaceInvadersNoFrameskip-v4  --no-render  --n-timesteps 5000  --folder logs/`

```
2025-02-16 22:01:02.489803: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:477] Unable to register cuFFT factory: Attempting
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1739743262.509909   20976 cuda_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin cuDN
E0000 00:00:1739743262.516098   20976 cuda_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin cu
2025-02-16 22:01:02.539170: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available CP
To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
Loading latest experiment, id=4
```

```
Loading logs/dqn/SpaceInvadersNoFrameskip-v4_4/SpaceInvadersNoFrameskip-v4.zip
A.L.E: Arcade Learning Environment (version 0.10.1+unknown)
[Powered by Stella]
Stacking 4 frames
Atari Episode Score: 575.00
Atari Episode Length 4731
Atari Episode Score: 425.00
Atari Episode Length 3315
Atari Episode Score: 410.00
Atari Episode Length 2987
Atari Episode Score: 385.00
Atari Episode Length 2241
Atari Episode Score: 585.00
Atari Episode Length 4625
```

```python
from huggingface_hub import notebook_login # To log to our Hugging Face account to be able to upload models to the Hub.
notebook_login()
!git config --global credential.helper store
```

```
!python -m rl_zoo3.push_to_hub  --algo dqn  --env SpaceInvadersNoFrameskip-v4  --repo-name dqn-SpaceInvadersNoFrameskip-v4 -orga Vanheart -f
```

```
2025-02-16 22:02:28.184611: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:477] Unable to register cuFFT factory: Attempti
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1739743348.204912    21351 cuda_dnn.cc:8310] Unable to register cuDNN factory: Attempting to register factory for plugin
E0000 00:00:1739743348.211242    21351 cuda_blas.cc:1418] Unable to register cuBLAS factory: Attempting to register factory for plugin
2025-02-16 22:02:28.232306: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available
To enable the following instructions: AVX2 AVX512F FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
Loading latest experiment, id=4
Loading logs/dqn/SpaceInvadersNoFrameskip-v4_4/SpaceInvadersNoFrameskip-v4.zip
A.L.E: Arcade Learning Environment (version 0.10.1+unknown)
[Powered by Stella]
Stacking 4 frames
Wrapping the env in a VecTransposeImage.
Uploading to Vanheart/dqn-SpaceInvadersNoFrameskip-v4, make sure to have the rights
ℹ This function will save, evaluate, generate a video of your agent,
create a model card and push everything to the hub. It might take up to some
minutes if video generation is activated. This is a work in progress: if you
encounter a bug, please open an issue.
Fetching 1 files:   0% 0/1 [00:00<?, ?it/s]
.gitattributes: 100% 1.52k/1.52k [00:00<00:00, 9.74MB/s]
Fetching 1 files: 100% 1/1 [00:00<00:00,  3.21it/s]
Saving model to: hub/dqn-SpaceInvadersNoFrameskip-v4/dqn-SpaceInvadersNoFrameskip-v4
Saving video to /tmp/tmpia9k7nvh/-step-0-to-step-1000.mp4
/usr/local/lib/python3.11/dist-packages/moviepy/config_defaults.py:1: DeprecationWarning: invalid escape sequence '\P'
  """
Moviepy - Building video /tmp/tmpia9k7nvh/-step-0-to-step-1000.mp4.
Moviepy - Writing video /tmp/tmpia9k7nvh/-step-0-to-step-1000.mp4

Moviepy - Done !
Moviepy - video ready /tmp/tmpia9k7nvh/-step-0-to-step-1000.mp4
✗ 'DummyVecEnv' object has no attribute 'video_recorder'
✗ We are unable to generate a replay of your agent, the package_to_hub
process continues
✗ Please open an issue at
https://github.com/huggingface/huggingface_sb3/issues
ℹ Pushing repo dqn-SpaceInvadersNoFrameskip-v4 to the Hugging Face
Hub
policy.optimizer.pth:   0% 0.00/13.5M [00:00<?, ?B/s]
policy.pth:   0% 0.00/13.5M [00:00<?, ?B/s]

pytorch_variables.pth:   0% 0.00/864 [00:00<?, ?B/s]


dqn-SpaceInvadersNoFrameskip-v4.zip:   0% 0.00/27.2M [00:00<?, ?B/s]



Upload 5 LFS files:   0% 0/5 [00:00<?, ?it/s]




train_eval_metrics.zip:   0% 0.00/17.3k [00:00<?, ?B/s]


dqn-SpaceInvadersNoFrameskip-v4.zip:  11% 2.93M/27.2M [00:00<00:00, 25.5MB/s]
pytorch_variables.pth: 100% 864/864 [00:00<00:00, 5.52kB/s]
train_eval_metrics.zip: 100% 17.3k/17.3k [00:00<00:00, 102kB/s]
```