AI upscales Apollo lunar footage to 60 FPS

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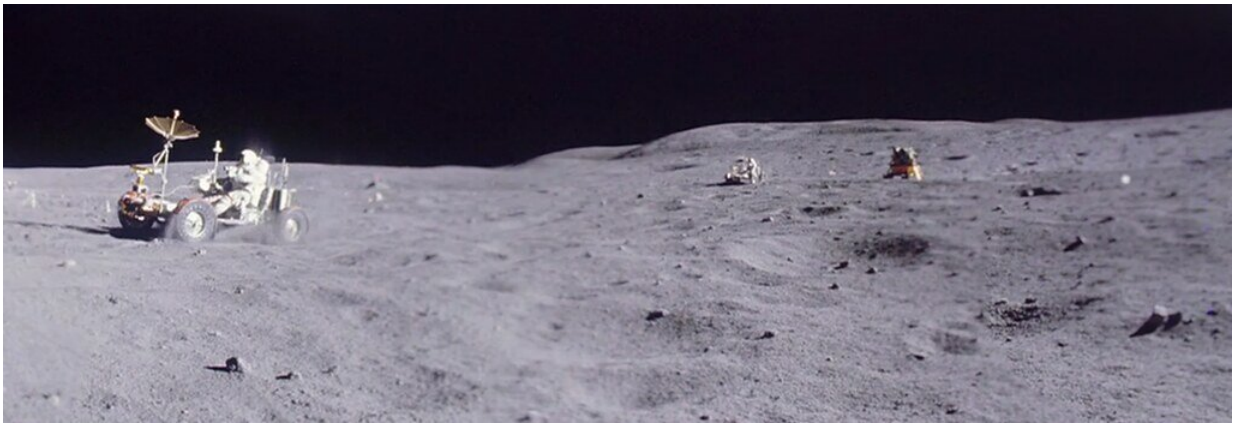

Credit: Dutchsteammachine

As exciting and thrilling as it is to watch all the historic footage from the Apollo moon landings, you have to admit, the quality is sometimes not all that great. Even though NASA has worked on restoring and enhancing some of the most popular Apollo footage, some of it is still grainy or blurry.

But now, new developments in artificial intelligence have come to the rescue, providing viewers a nearly brand-new experience in watching historic Apollo video.

A photo and film restoration specialist who goes by the name of DutchSteamMachine has worked some AI magic to enhance original

Apollo film, creating strikingly clear and vivid video clips and images.

"I really wanted to provide an experience on this old footage that has not been seen before," he told Universe Today.

Take a look at this enhanced footage from an Apollo 16 lunar rover traverse with Charlie Duke and John Young, in which the footage that was originally shot at 12 frames per second (fps) has been increased to 60 fps:

Stunning, right? And I was blown away by the crisp view of the moon's surface in this enhanced view of Apollo 15's landing site at Hadley Rille:

Or take a look at how clearly Neil Armstrong is visible in this enhanced version of the often-seen "first step" video from Apollo 11 taken by a 16-mm video camera inside the Lunar Module:

The AI that DutchSteamMachine uses is called Depth-Aware video frame INterpolation, or DAIN for short. This AI is open source, free and constantly being developed and improved upon. Motion interpolation or motion-compensated frame interpolation is a form of video processing in which intermediate animation frames are generated between existing ones in an attempt to make the video more fluid, to compensate for blurriness, etc.

"People have used the same AI programs to bring old film recordings from the 1900s back to life, in high definition and color," he said. "This technique seemed like a great thing to apply to much newer footage."

But you may not be able to try this at home. It takes a powerful, high-

end GPU with special cooling fans. DutchSteamMachine said that a video of just five minutes can take anywhere from six to 20 hours to complete. But the results speak for themselves.

He explained how he does this work: "First I set out to find the highest quality source videos, which I thankfully found as high-bitrate 720p video files," he said. "So the quality problem was solved. It is important to start with the highest possible source and edit from there. However, most of the sequences shot were still very choppy. This is because to spare film and record for long periods of time, most of the rover footage was shot at 12, six or even one frame(s) per second. While people have previously tried to apply stabilization and/or types of frame blending to ease this effect, I have never really been satisfied with it."

DutchSteamMachine looks to determine the framerate of the original footage, which can usually be found in NASA documents or, as in the case of the Apollo 16 footage above, the astronauts announce it when they turn the camera on.

"Unfortunately, sometimes, the framerate seems to be off or fluctuating, not always working as intended," he said. "So the best way to find the framerate is to listen to landmarks the astronauts are talking about and match the footage to that. I split the source file up into individual PNG frames, input them to the AI together with the input framerate (one, six, 12 or 24) and the desired output framerate by rate of interpolation (2x, 4x, 8x). The AI starts using my GPU and looks at two real, consecutive frames. Using algorithms, it analyzes movements of objects in the two frames and renders entirely new ones. With an interpolation rate of, for example, 5x, it is able to render five 'fake' frames from just two real frames. If footage was recorded at 12 fps and the interpolation rate is set to 5x, the final framerate will be 60, meaning that with just 12 real frames, it made 48 'fake' frames. Both are then exported back to a video and played back at 60 fps with both the real and fake frames.Finally, I

apply color correction, as often the source files have a blue or orange tint to them. I synchronize the footage with audio, and if possible, also television and photos taken at the same time. Sometimes, two 16-mm cameras were running at the same time, so I can play those back next to each other."

Here's a video he shared of his studio and his specialized equipment:

DutchSteamMachine does this work in his spare time, and posts it for free on his YouTube page. His tagline is "Preserving the past for the future," and he also uses the same techniques to enhance old home video, images and slides.

"It's great to read people's reactions on my footage," he said. "So when people post things like, 'Wow! This is amazing! I have never seen this before!,' this keeps me going."

If you'd like to support the amazing restoration/enhancement work that DutchSteamMachine is doing for the Apollo footage, here's his Patreon Page. By supporting his work, you'll get extras, early access and previews of upcoming work, and a chance to ask questions about the process. And he's planning to keep it all coming.

"I plan to improve tons of Apollo footage like this," he said. "A lot more space and history-related footage is going to be published on my YT channel continuously." He also has a Flickr page with more enhanced imagery.

More information: Depth-Aware video frame INterpolation: grisk.itch.io/dain-app

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