# Root Cause Analysis and Resolution Strategies for "Invalid Wheel Filename" Error During PyTorch Installation on NVIDIA Jetson Nano (JetPack 6.2)

## Abstract

This research paper investigates the persistent "invalid wheel filename" error encountered during attempts to install PyTorch using pre-built NVIDIA wheel files on the NVIDIA Jetson Nano platform running JetPack 6.2. Despite multiple attempts to download and install the recommended wheel, including using pip3 with and without sudo, re-downloading with different tools (wget, curl), and re-installing pip3, the error persists. This paper aims to: (1) diagnose the underlying cause of this error, (2) explore potential software or system configuration conflicts specific to JetPack 6.2 that might be responsible, (3) evaluate different PyTorch installation methods for Jetson Nano (including wheel installation and building from source), and (4) propose a robust and reliable solution for successful PyTorch installation with GPU acceleration on this platform. The research will involve a systematic investigation of error logs, system configurations, relevant NVIDIA documentation, developer forums, and potentially the evaluation of diagnostic tools to pinpoint the source of the installation failure and validate potential resolutions.

## Introduction

The NVIDIA Jetson Nano is a popular platform for deploying machine learning models at the edge due to its compact form factor, low power consumption, and impressive processing capabilities. PyTorch, a leading deep learning framework, is often the preferred choice for developing and deploying these models. However, users frequently encounter challenges when installing PyTorch on the Jetson Nano, particularly when using pre-built wheel files provided by NVIDIA. For example, developers attempting to deploy a computer vision model for real-time object detection on a Jetson Nano-powered robot might encounter this error, delaying the project and hindering progress. One common error message that arises during this process is the "invalid wheel filename" error. This error can be frustrating and time-consuming to resolve, hindering the development and deployment of machine learning applications on the Jetson Nano.

This research paper delves into the root cause of this error, examining various factors that could contribute to its occurrence. It explores potential compatibility issues, system configuration conflicts, and installation procedure intricacies specific to JetPack 6.2, the latest software suite for Jetson devices. The paper also investigates alternative installation methods, such as building PyTorch from source, and evaluates their feasibility and reliability as potential solutions.

## Literature Review

While there is no specific literature dedicated solely to the "invalid wheel filename" error in the context of PyTorch installation on Jetson Nano with JetPack 6.2, several resources provide valuable insights into potential causes and solutions.

The Microsoft Azure documentation on troubleshooting environments 1 highlights common causes of "Invalid Wheel Filename" errors, including issues with environment names, Docker configurations, and base image compatibility. Although this documentation focuses on Azure Machine Learning environments, some of the underlying principles and troubleshooting steps may be relevant to the Jetson Nano context.

The official NVIDIA documentation for installing PyTorch on Jetson platforms 2 provides detailed instructions and prerequisites for successful installation. It emphasizes the importance of compatibility between PyTorch versions, JetPack versions, and CUDA toolkit versions. This documentation serves as a primary reference for understanding the recommended installation procedures and potential compatibility issues.

Discussions on the NVIDIA Developer Forums 3 offer valuable insights from developers and users who have encountered similar PyTorch installation problems on Jetson devices. These discussions often highlight specific issues related to JetPack versions, USB connectivity, and potential workarounds.

## Alternative Installation Methods

Before diving into the results of our investigation into the "invalid wheel filename" error, let's explore alternative installation methods, particularly building PyTorch from source. This approach can be valuable when encountering persistent issues with pre-built wheel files.

Building PyTorch from source provides greater control over the installation process and allows for customization based on specific needs. However, it can be more complex and time-consuming than using wheel files2. This method requires careful attention to dependencies, build configurations, and potential compilation errors.

For users with Macbook M1 processors, setting up the development environment for building PyTorch from source can be particularly challenging10. It often involves troubleshooting compatibility issues and finding workarounds for specific configurations.

Despite the added complexity, building from source offers several advantages:

* **Latest Version:** It allows for installing the latest PyTorch version, which may not be available as a pre-built wheel file.
* **Customization:** Users can customize the build process to optimize for specific hardware or software configurations.
* **Troubleshooting:** Building from source can provide more detailed error messages and insights into the installation process, aiding in troubleshooting.

If wheel installation continues to fail, building from source can be a viable solution, especially when specific customization or the latest PyTorch features are required.

### Building PyTorch from Source: Process and Challenges

Building PyTorch from source involves several steps, including cloning the PyTorch repository, installing dependencies, configuring the build, compiling the source code, and verifying the installation 8. However, this process can be prone to errors and challenges.

Some common challenges include:

* **Long build times:** Building PyTorch from source can take several hours on the Jetson Nano, depending on the hardware 11.
* **Dependency issues:** Missing or conflicting dependencies can cause build errors 13.
* **Compatibility problems:** Compatibility issues between different software versions, such as CUDA, cuDNN, and Python, can lead to build failures 15.
* **CMake configuration:** Incorrect CMake configuration can result in build errors 8.
* **System configuration:** Issues with the system configuration or environment variables can also cause problems 17.

Despite these challenges, building from source can be a viable option when pre-built wheels fail to install. It allows for greater control over the installation process and can be useful for troubleshooting and customization.

## Methodology

To investigate the "invalid wheel filename" error, this research employed a systematic approach involving the following steps:

1. **Error Log Analysis:** Examine the complete output of pip3 install commands, including verbose flags (-v or --verbose), to identify specific error messages, warnings, or clues beyond the generic "invalid wheel filename" message. This step is crucial for understanding the underlying cause of the error, as the full error logs often provide more specific information than the initial message.
2. **Wheel File Integrity Verification:** Re-verify the SHA256 checksum of the downloaded wheel file against the official source (if available) to ensure the file has not been corrupted during download. Additionally, explore tools like wheel unpack or unzip to inspect the contents of the wheel file for any structural issues. A corrupted wheel file can have an invalid structure, leading to the "invalid wheel filename" error. Checksum verification helps ensure the downloaded file matches the original, while inspection tools can reveal potential structural problems within the wheel file19.
3. **System Compatibility Checks:** Verify the system architecture (aarch64), Python version (3.10), and JetPack 6.2 components (CUDA, cuDNN) against the PyTorch compatibility requirements for the downloaded wheel file. Ensure that all prerequisites are met and that there are no conflicts between different software versions. PyTorch wheel files are built for specific architectures, operating systems, and CUDA toolkit versions. Incompatibility between the wheel file and the system can lead to installation errors2. This step also involves installing the required system packages for PyTorch using the following commands:

Bash

sudo apt-get -y update  
sudo apt-get install -y python3-pip libopenblas-dev

For PyTorch versions 24.06 and later, the cusparselt library needs to be installed first using the install\_cusparselt.sh script:

Bash

wget raw.githubusercontent.com/pytorch/pytorch/5c6af2b583709f6176898c017424dc9981023c28/.ci/docker/common/install\_cusparselt.sh  
export CUDA\_VERSION=12.1 # Replace with your CUDA version  
bash ./install\_cusparselt.sh

1. **PyTorch Compilation Check:** Use the roc-obj-ls tool to check if PyTorch is compiled with the correct gfx target. This helps identify potential compatibility issues between PyTorch and the Jetson Nano's GPU architecture17.
2. **pip3 Configuration and Environment:** Investigate pip3 configuration files and environment variables related to Python and pip3 to identify any potential misconfigurations. Examine the $PATH and PYTHONPATH variables to ensure they are correctly set. Use commands like pip3 config list and pip3 debug to gather further information about the pip3 environment. Incorrect pip3 configurations or environment variables can interfere with the installation process.
3. **Dependency Analysis:** Research PyTorch dependencies for Jetson/aarch64 and JetPack 6.2. Check for potential version mismatches or missing dependencies on the system. Utilize tools like pip3 show torch, pip3 check, and ldd to analyze dependencies and identify any conflicts. Missing or conflicting dependencies can prevent PyTorch from installing correctly.
4. **NVIDIA Documentation and Developer Forums:** Conduct an in-depth review of the official NVIDIA documentation for PyTorch on Jetson and relevant discussions in the NVIDIA Developer Forums. Search for keywords like "invalid wheel filename," JetPack 6.2, and related terms to identify potential solutions or known issues. These resources often contain valuable information and solutions from NVIDIA and the Jetson community.
5. **Diagnostic Scripts/Tools:** Explore any existing diagnostic scripts or tools (from NVIDIA or the community) specifically designed to troubleshoot PyTorch installation issues on Jetson platforms. These tools can help automate certain checks and provide more detailed diagnostics.

## Results

This section presents the findings from the investigation steps outlined in the methodology.

### Wheel File Integrity

While the research material does not include specific details about the wheel file used, it's crucial to verify its integrity. Corrupted downloads can lead to the "invalid wheel filename" error.

### System Compatibility Issues

Ensuring system compatibility is essential for successful PyTorch installation. The Jetson Nano with JetPack 6.2 has the following relevant system configurations:

| Feature | Version |
| --- | --- |
| Architecture | aarch64 |
| Operating System | Ubuntu 22.04 |
| Python Version | 3.10 |
| CUDA Toolkit | 12.1 (example) |

It is crucial to verify that the downloaded PyTorch wheel file is compatible with these configurations. Matching the PyTorch version with the JetPack version is particularly important to avoid compatibility issues2.

### Dependency Conflicts

PyTorch has several dependencies, and conflicts or missing dependencies can lead to installation errors. It is essential to research the specific dependencies for PyTorch on Jetson/aarch64 with JetPack 6.2 and ensure that all required dependencies are installed and their versions are compatible.

## Discussion

The "invalid wheel filename" error during PyTorch installation on Jetson Nano with JetPack 6.2 can stem from various factors, including corrupted downloads, incompatible wheel files, system configuration issues, and dependency conflicts. While the absence of detailed error logs in the provided research material limits a comprehensive analysis, the research highlights several potential causes and suggests a systematic approach to troubleshoot and resolve the error.

One crucial insight from the research is that NVIDIA has not yet officially released a PyTorch build that is fully compatible with JetPack 6.2 and cuDNN 9.315. This incompatibility could be a significant contributor to the "invalid wheel filename" error. Potential workarounds include downgrading to JetPack 6.1, which has a verified PyTorch build, or using Docker images provided by NVIDIA to simplify dependency management.

Verifying the integrity of the downloaded wheel file, ensuring system compatibility, and analyzing dependencies are crucial steps in identifying the root cause. If wheel installation remains unsuccessful, building PyTorch from source can be considered as an alternative, albeit more involved, solution.

## Conclusion

This research paper provides a preliminary investigation into the "invalid wheel filename" error encountered during PyTorch installation on NVIDIA Jetson Nano with JetPack 6.2. While further analysis of the specific error logs and system configurations is necessary for a definitive diagnosis, the research highlights key areas to investigate and potential solutions to explore.

Based on the findings, the following recommendations are proposed:

* **Thorough Error Log Analysis:** Obtain and analyze the complete error logs from the pip3 install command to identify specific error messages and clues. This can help pinpoint the exact cause of the error.
* **Wheel File Verification:** Always verify the integrity of the downloaded wheel file using checksums and inspect its contents for any structural issues. A corrupted download can often be resolved by re-downloading the file.
* **System Compatibility:** Carefully check the compatibility of the PyTorch wheel file with the Jetson Nano's architecture, operating system, Python version, and CUDA toolkit version. Using an incompatible wheel file can lead to installation errors.
* **Dependency Management:** Ensure that all required dependencies are installed and their versions are compatible with PyTorch. Conflicts or missing dependencies can prevent PyTorch from installing correctly.
* **Consider Building from Source:** If wheel installation consistently fails, explore building PyTorch from source as a potential solution. This method offers more control and customization but requires more technical expertise.
* **Consult NVIDIA Resources:** Refer to the official NVIDIA documentation and actively engage in the NVIDIA Developer Forums to seek assistance and learn from others' experiences. These resources can provide valuable insights and solutions.

Furthermore, this research suggests that using Docker containers can be a simplified approach for managing dependencies and ensuring a consistent environment for PyTorch on Jetson Nano10. Docker containers encapsulate the necessary dependencies and configurations, reducing the risk of conflicts and simplifying the installation process.

By following these recommendations, users can increase their chances of successfully installing PyTorch on their Jetson Nano devices and overcome the "invalid wheel filename" error. This research contributes to a better understanding of PyTorch installation challenges on the Jetson Nano platform and provides valuable guidance for developers and users in the Jetson community. Future work could involve a more in-depth analysis of error logs, investigation of specific compatibility issues with JetPack 6.2 and cuDNN 9.3, and a comprehensive evaluation of building PyTorch from source on different Jetson Nano configurations.

#### Works cited

1. Troubleshoot environment images - Azure Machine Learning ..., accessed February 13, 2025, <https://learn.microsoft.com/en-us/azure/machine-learning/how-to-troubleshoot-environments?view=azureml-api-2>

2. Installing PyTorch for Jetson Platform - NVIDIA Docs, accessed February 13, 2025, <https://docs.nvidia.com/deeplearning/frameworks/install-pytorch-jetson-platform/index.html>

3. Jetpack 6.2 Installation Failing [Jetson Orin Nano Dev Kit 8GB] - NVIDIA Developer Forums, accessed February 13, 2025, <https://forums.developer.nvidia.com/t/jetpack-6-2-installation-failing-jetson-orin-nano-dev-kit-8gb/322183>

4. Avoiding apt upgrade from Jetpack 6.1 to Jetpack 6.2 - NVIDIA Developer Forums, accessed February 13, 2025, <https://forums.developer.nvidia.com/t/avoiding-apt-upgrade-from-jetpack-6-1-to-jetpack-6-2/322877>

5. Torch on Jetson Jetpack 6.2 - NVIDIA Developer Forums, accessed February 13, 2025, <https://forums.developer.nvidia.com/t/torch-on-jetson-jetpack-6-2/322770>

6. Failed to connect Jetson Orin Nano Dev. Kit to host via USB C after flashing Jetpack 6.2, accessed February 13, 2025, <https://forums.developer.nvidia.com/t/failed-to-connect-jetson-orin-nano-dev-kit-to-host-via-usb-c-after-flashing-jetpack-6-2/323030>

7. Latest Jetson AGX Orin topics - NVIDIA Developer Forums, accessed February 13, 2025, <https://forums.developer.nvidia.com/c/robotics-edge-computing/jetson-embedded-systems/jetson-agx-orin/486>

8. Build Pytorch Jetson Nano | Restackio, accessed February 13, 2025, <https://www.restack.io/p/pytorch-answer-build-jetson-nano>

9. [Tutorial] How to Install Pytorch and Torchvision on Jetson Nano - YouTube, accessed February 13, 2025, <https://www.youtube.com/watch?v=o8QuRm-is_I>

10. Getting Started with Contributing to PyTorch: A Deep Dive | by Georgia Tech Open Source Program Office | Medium, accessed February 13, 2025, <https://medium.com/@gt-ospo/getting-started-with-contributing-to-pytorch-a-deep-dive-9e80780db89f>

11. Build PyTorch from source. Questions - windows, accessed February 13, 2025, <https://discuss.pytorch.org/t/build-pytorch-from-source-questions/138531>

12. How to Install PyTorch: A Step-by-Step Guide, accessed February 13, 2025, <https://botpenguin.com/blogs/how-to-install-pytorch-a-step-by-step-guide>

13. Help with Pytorch, torchvision on Jetpack 6 - Jetson Orin Nano - NVIDIA Developer Forums, accessed February 13, 2025, <https://forums.developer.nvidia.com/t/help-with-pytorch-torchvision-on-jetpack-6/284871>

14. How to build pytorch source? - Stack Overflow, accessed February 13, 2025, <https://stackoverflow.com/questions/71075872/how-to-build-pytorch-source>

15. Yolo incompatible with Jetpack 6.2(Jetson Orin Nano Super) · Issue #18829 - GitHub, accessed February 13, 2025, <https://github.com/ultralytics/ultralytics/issues/18829>

16. Pytorch Build from Source gives Error make: \*\*\* No rule to make target 'install'. Stop, accessed February 13, 2025, <https://stackoverflow.com/questions/56802904/pytorch-build-from-source-gives-error-make-no-rule-to-make-target-install>

17. PyTorch on ROCm — ROCm installation (Linux) - ROCm Documentation - AMD, accessed February 13, 2025, <https://rocm.docs.amd.com/projects/install-on-linux/en/latest/install/3rd-party/pytorch-install.html>

18. Where to Install Pytorch - Installation Guide - FastBots.ai, accessed February 13, 2025, <https://fastbots.ai/blog/where-to-install-pytorch-installation-guide>

19. Verify game file integrity causes entire game to re-download every time - Reddit, accessed February 13, 2025, <https://www.reddit.com/r/PCRedDead/comments/n0t59k/verify_game_file_integrity_causes_entire_game_to/>

20. How to check whl file correctly generated - Stack Overflow, accessed February 13, 2025, <https://stackoverflow.com/questions/57574354/how-to-check-whl-file-correctly-generated>

21. Verify Integrity files - causes another download - r u kidding me? - General Discussion, accessed February 13, 2025, <https://forums.flightsimulator.com/t/verify-integrity-files-causes-another-download-r-u-kidding-me/316958>

22. How to fix data redownloading if you backed up your install folder - PC FIX : r/fo76 - Reddit, accessed February 13, 2025, <https://www.reddit.com/r/fo76/comments/9st86q/how_to_fix_data_redownloading_if_you_backed_up/>

23. verify integrity of game cache - why is it downloading the entire game?? :: Help and Tips, accessed February 13, 2025, <https://steamcommunity.com/discussions/forum/1/541907867781647305/>