AI Navigator V1.0.0

Release Note

Thank you very much for your interest in AI Navigator.

This document describes this product installation, restrictions and so on. Please read this document before using the product.

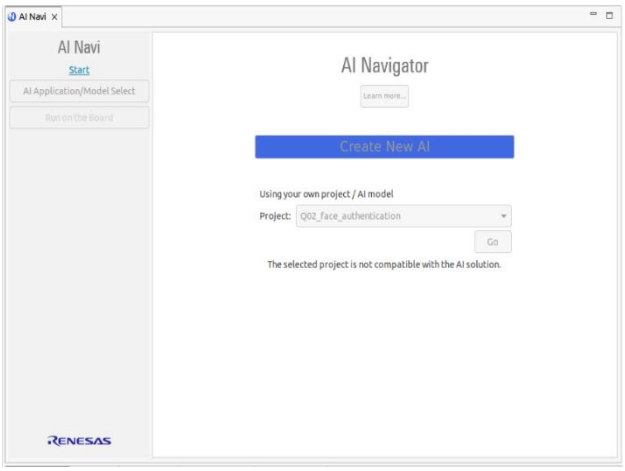
Contents

1. About AI Navigator

1.1 Summary

AI Navigator is one of several plugins which operate under the e^2 studio integrated development environment.

In using AI (Artificial Intelligence) embedded system development, this product allows for integrate and operate the various functions needed to develop AI. This shortens the development period.



- Supports selecting the AI Application from AI Application Zoo and downloading the corresponding e^{2}studio projects. It makes AI development starting easy.
- Supports the transfer learning feature. Allows customization of AI models for supported AI applications with their own datasets.
- Supports for conversion of AI models to executable files. The tool for RZ/V2L allows conversion to DRP-AI executable code using TVM.

1.2 Target Plugin

- Renesas AI Navigator Plugin V1.0.0
- RZ/V AI TLT Plugin V1.0.0 (Plugin for Transfer Learning Tool)
- DRP-AI TVM Tool Plugin V1.0.0 (Plugin for TVM Tool)

1.3 Supported Environment

- Ubuntu 20.04 LTS
- Renesas e^2 studio 2024-01 (or later) for Linux

1.4 Supported MCU, MPU

RZ family

- RZ/V Series RZ/V2L group

1.5 AI Navigator Quick Start Guide

Please read the “AI Navigator Quick Start Guide” for more details on know how to use AI Navigator.

(URL) https://renesas-rz.github.io/rzv_ai_sdk/latest/ainavi_quick_start_guide

2. Installation and Uninstallation

2.1 Installing This Product

Use either of the following procedure to install this product.

2.1.1 Install from the e² studio installer

1. Start e² studio installer.
2. On the [Additional Software] page, select the [Renesas AI Navigator], [RZ/V AI TLT], [DRP-AI TVM Tool] check box in [Renesas AI] category, and click the [Next>] button.
3. Progress and install the e² studio.
4. Start this product from the [Renesas Views] - [Renesas AI] – [AI Navi] menu of e² studio. For details about how to use this product, see the [Help] menu of e² studio and AI Navigator Quick Start Guide.

2.1.2 Install from the "Install Renesas IDE Features" menu of e² studio

1. Start e² studio.
2. Select the [Help] – [Install Renesas IDE Features] menu of e² studio to open the [Install Renesas IDE Features] dialog box.
3. Select the [Renesas AI Navigator], [RZ/V AI TLT], [DRP-AI TVM Tool] check box, and click the [Finish] button.
4. Check that [Renesas AI Navigator], [RZ/V AI TLT], [DRP-AI TVM Tool] is selected in the [Install] dialog box and click the [Next>] button.
5. Check that [Renesas AI Navigator], [RZ/V AI TLT], [DRP-AI TVM Tool] is selected as the target of installation and click the [Next>] button.
6. After confirming the license agreements, if you agree to the license, select the [I accept the terms of the license agreements] radio button, and click the [Finish] button.
7. If the dialog of the trust certificate is displayed, check that certificate, and click the [OK] button to continue installation.
8. When prompted to restart e² studio, click [Restart Now].
9. Start this product from the [Renesas Views] - [Renesas AI] – [AI Navi] menu of e² studio. For details about how to use this product, see the [Help] menu of e² studio and Getting Started.

2.1.3 Install using Plugin file (zip file)

1. Start e² studio.
2. From the [Help] menu, select [Install New Software...] to open the [Install] dialog box.
3. Click the [Add...] button to open the [Add Repository] dialog box.
4. Click the [Archive] button, select the Zip file in the opened dialog box, and click the [Open] button.
5. Click the [OK] button in the [Add Repository] dialog box.
6. Expand the [Renesas AI] item shown in the [Install] dialog box, select the [Renesas AI Navigator], [RZ/V AI TLT], [DRP-AI TVM Tool] check box, and then click the [Next>] button.
   * If you check off the [Contact all update sites during install to find required software] checkbox, you can shorten the installation time.
7. Check that [Renesas AI Navigator], [RZ/V AI TLT], [DRP-AI TVM Tool] is selected as the target of installation and click the [Next>] button.
8. After confirming the license agreements, if you agree to the license, select the [I accept the terms of the license agreements] radio button, and click the [Finish] button.
9. If the dialog of the trust certificate is displayed, check that certificate, and click the [OK] button to continue installation.
10. When prompted to restart e² studio, restart it.
11. Start this product from the [Renesas Views] - [Renesas AI] – [AI Navi] menu of e² studio. For details about how to use this product, see the [Help] menu of e² studio and AI Navigator Quick Start Guide.

2.2 Uninstalling This Product

Use the following procedure to uninstall this product.

1. Start e^2 studio.
2. Select [Help] – [About e^2 studio] to open the [About e^2 studio] dialog box.
3. Click the [Installation Details] button to open the [e^2 studio Installation Details] dialog box.
4. Select [Renesas AI Framework], [RZ/V AI TLT], [DRP-AI TVM Tool] displayed on the [Installed Software] tabbed page and click the [Uninstall...] button to open the [Uninstall] dialog box.
5. Check the displayed information and click the [Finish] button.
6. When prompted to restart e^2 studio, click [Restart Now].
   * If you have operated transition learning or TVM conversion within AI Navigator, the Docker image may remain. Please delete them separately.

3. Notes / Restrictions

3.1 Usage Considerations

3.1.1 [TLT Plugin] Interruption during installation

If you interrupt the RZ/V AI TLT installation by pressing the "Cancel" button during the RZ/V AI TLT installation using the [Start Settings...] button in the AI Navigator, the installation result up to the point of interruption remains as it is. Click the [Start Settings...] button again and proceed with the installation process to the end to complete the installation.

3.1.2 [TLT Plugin] Operation when reinstalling

After installing the RZ/V AI TLT from the AI Navigator, pressing the [Start Settings...] button will start the reinstallation process, but an error will occur due to the installation of the Docker container. If the reinstallation is interrupted, the operation of the RZ/V AI TLT is not affected.

3.1.3 [TLT Plugin] Individual installation

When installing RZ/V AI TLT using the [Start Settings...] button or starting RZ/V AI TLT using the [Transfer Learning...] button on AI Navigator, installation and starting may not be successful if RZ/V AI TLT itself has already been installed separately. If you have already installed RZ/V AI TLT individually, please remove the existing Docker container.

3.1.4 [TLT Plugin] End of transition learning tools through dialogue

[Transfer Learning...] If the "Cancel" button in the modal dialogue is pressed while the RZ/V AI TLT is being started by pressing the [Cancel] button, the RZ/V AI TLT is also terminated. In addition, the function to automatically input the ONNX model obtained as a result of transition learning by the RZ/V AI TLT into the DRP-AI TVM Plugin may not work.

3.1.5 [TLT Plugin] Supported AI applications

For the following applications, RZ/V AI TLT will not be activated by pressing the [Transfer Learning...] button as transfer learning is not supported by RZ/V TLT as of January 2024.

Q02, Q05, Q10, Q11

If the [Transfer Learning...] button is pressed in these application projects, the error message "No executable transfer learning plug-ins were found" is displayed. This may be supported in the future.

3.1.6 [TVM Plugin] Procedure for preferences function

When setting up the DRP-AI TVM Tool environment, please follow the steps below.
(1) Open the AI model conversion screen from [Convert AI Model] in the AI Navigator Menu and click the [Start Settings...] button.
(2) A confirmation window appears, stating that it will take some time to complete the settings. Click [OK].
(3) The DRP-AI TVM Tool opens and click the [Setup the environment] button in the Project setting screen to set the environment.
* Once the environment has been set up, reinstallation using [Setup the environment] is not required.
* If the zip download destination directory path has not been set, the [Start Settings...] button without setting the zip download destination directory path, a warning window for setting the zip download destination directory path appears. After setting the directory path, click the [Start Settings....] Click the [Start Settings...] button again.

3.1.7 [TVM Plugin] Closing the TVM GUI Tool

The DRP-AI TVM Tool should be closed except when it is being used.
When the DRP-AI TVM Tool is open, the directory path where the downloaded Zip file is stored and the file path of the model after transition training in the RZ/V AI TLT are not correctly reflected in the DRP-AI TVM Tool.

3.1.8 [TVM Plugin] Pre-processing skip settings

For the following AI applications, pre-processing must be skipped.
To skip pre-processing, uncheck the box "Use DRP-AI to speed up preprocessing" in the Preprocess setting screen and click Next.
Q02, Q03, Q04, Q05, Q07, Q09

3.1.9 [TVM Plugin] Path display of Pytorch input model files

If a PyTorch model is entered with a PyTorch definition with parameters, the input model file settings field in the project settings screen is displayed as an absolute path. This may not display all characters due to the small display area. This does not affect the operation.

3.1.10 [AI Navigator Plugin] Notes on the Run on the Board screen

If you click the [Create a bootable disk] button on the Run on the Board screen without specifying the AI SDK zip download destination directory path on the AI Application/Model Select screen, you will be asked to specify the download destination directory path.
After specifying the directory path, click the [Create a bootable disk...] button again. After specifying the directory path, click the [Create a bootable disk...] button again.

3.2 Functional Restrictions

3.2.1 [TLT Plugin] Transition learning operations in AI applications involving multiple AI models

The following RZ/V AI applications cannot start the transition learning tool (RZ/V AI TLT) because the downloaded e^2 studio project and the directory name expected by the transition learning tool do not match.

Q08

If you press the [Transfer Learning...] button in this application project, the error message "Failed to check the RZ/V AI TLT service. Please setup the RZ/V AI TLT properly.

Workaround:
After downloading the Q08 AI application with the AI Navigator function, perform the following operations.

1. In RZ/V AI TLT project folder (<Path to e^2 studio installation directory>/../rzv_ai_tlt/v2.10/tlt_backend/assets/), create “Q08_object_counter_animal” and “Q08_object_counter_vehicle” folder.

2. Copy the next files from Q08_object_counter folder

- Q08_object_counter_animal
  - config.yaml
- Q08_object_counter_vehicle
  - config1.yaml (* Change file name to config.yaml)

3.2.2 [TVM Plugin] Cancelling during the Setup environment function.

Do not click the [Cancel] button while the tool setup is being performed in the DRP-AI TVM Tool [Setup the environment]. The Cancel function will not work properly.

Workaround:

Nothing

3.2.3 [TVM Plugin] Docker image name created in the setup environment function

Do not change the Docker image name used in [Setup the environment] in the DRP-AI TVM Tool from the default name rzv2l_ai_sdk_image.

Changing the Docker image name from the default may result in incorrect environment settings.

Workaround:

Nothing

3.2.4 [TVM Plugin] Input way models other than in image format.

In the following RZ/V AI applications, TVM conversion cannot be performed only by operations on the TVM Plugin.
Q05 (Multi layer perceptron(mlp))
*Because the input format is a non-image (e.g. 1D) model; the same applies if the input format is the same for other models than Q05.

Workaround:

Please operate the following steps

(Example AI Application Q05 mlp)

1. In Preprocess setting screen, uncheck "Use DRP-AI to speed up preprocessing” box.
2. In Preprocess setting screen, input the model format in “shape_out” box, push [Next] button.

   ex. 1,10000

3. Open the file “<output directory>/drpai_tvm_tool_settings/<model file name>_input_shape.json, and modify the input format.

   ex. {"input":[1,10000]}

4. Click [Start DRP-AI translation] button, start converting.

3.2.5 [TVM Plugin] Cases where the sample code generation function cannot be used

In the following cases, sample code is not generated by clicking the [Generate sample code] button in the DRP-AI TVM translation screen. (Function for Experts who do not use AI applications)

- When the storage directory for pre-processing setting objects has been changed from the default when converting a multiple input model.

- When the "Use DRP-AI to speed up preprocessing" check box in the Preprocess setting is unchecked.

Workaround:

Nothing

3.2.6 [TVM Plugin] Saving pre-treatment settings

If the following operations are performed, the settings made in the Preprocess setting will not be saved.

- If, after setting the pre-processing settings in the Preprocess setting, you return to the Project setting screen without proceeding to the next step.

- When the "Use DRP-AI to speed up preprocessing" check box in the Preprocess setting is unchecked.

Workaround:

- After setting the pre-processing settings, go to the DRP-AI TVM Translation screen and then return to the Project setting screen.

- If you want to skip the preprocessing settings, clear the "Use DRP-AI to speed up preprocessing" checkbox each time.

3.2.7 [TVM Plugin] Output file directory for pre-processing settings

The directory for storing pre-processing objects always shows the default value as an absolute path when moving from the Project setting to the Preprocess setting.

If the directory is incorrect, reconfigure it.

Workaround:

Nothing

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Jan.26.2024	-	First edition issued.
1.01	Feb.29.2024	2	1.5 AI Navigator Quick Start Guide Added this section.
		3	Changed the name of following document. (Before) AI Navigator Getting Started (After) AI Navigator Quick Start Guide
		4	2.1.2 Install from the "Install Renesas IDE Features" menu of e^2 studio Corrected this installation process based on actual operation.

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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