實習題目 - 3
AI手寫辨識

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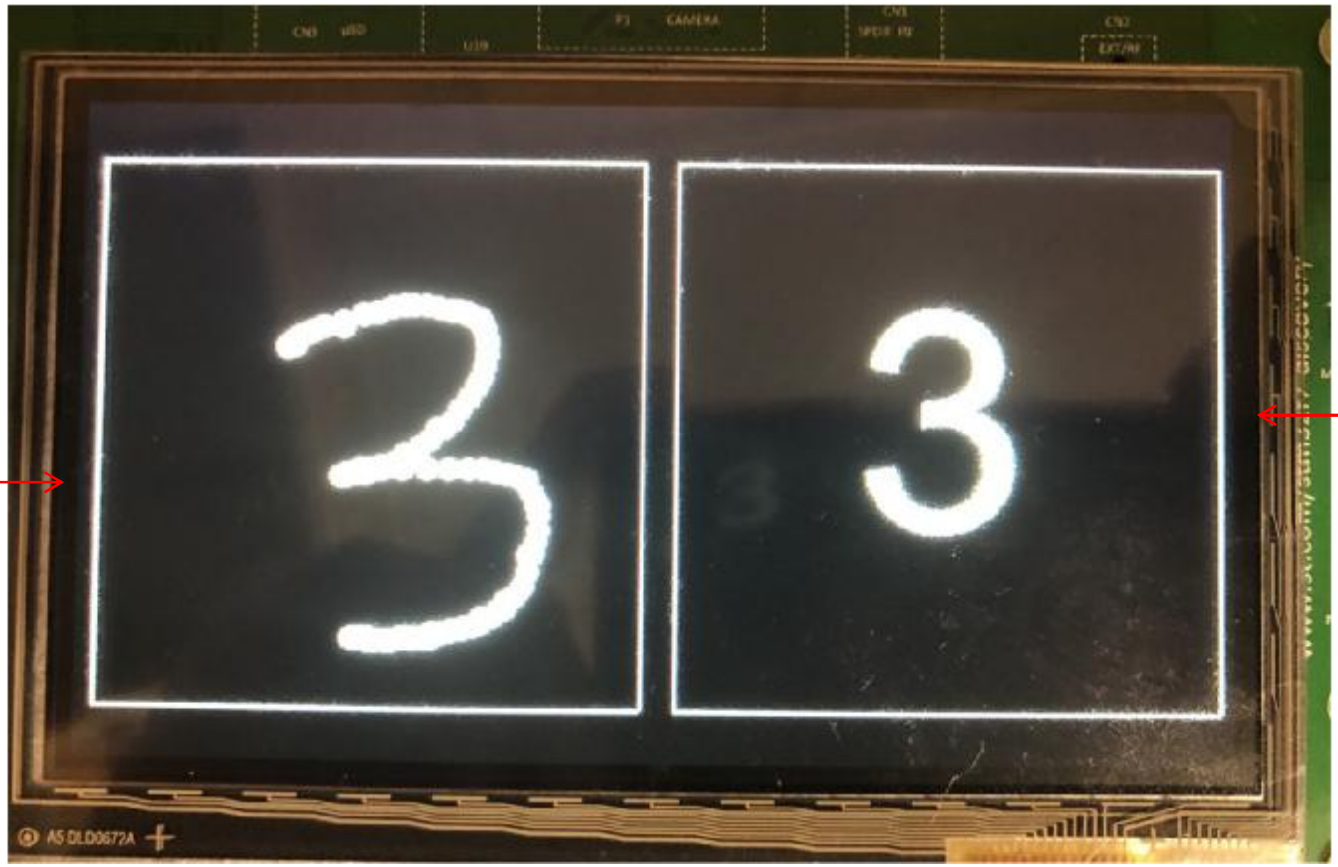
題目功能

- 初始畫面顯示左右兩個框 ，左邊為手寫板 ，右邊為按鈕和結果
- 未在手寫板寫東西時 ，點擊右邊按鈕不會有反應
- 手寫板部分顯示觸控痕跡
- 在手寫板寫入後， 點擊右邊框內 ，進行AI判斷並將結果顯示於右邊框內 ，顯示字形為Font57
- 當再次按下右邊按鈕，清除螢幕並 回到初始畫面

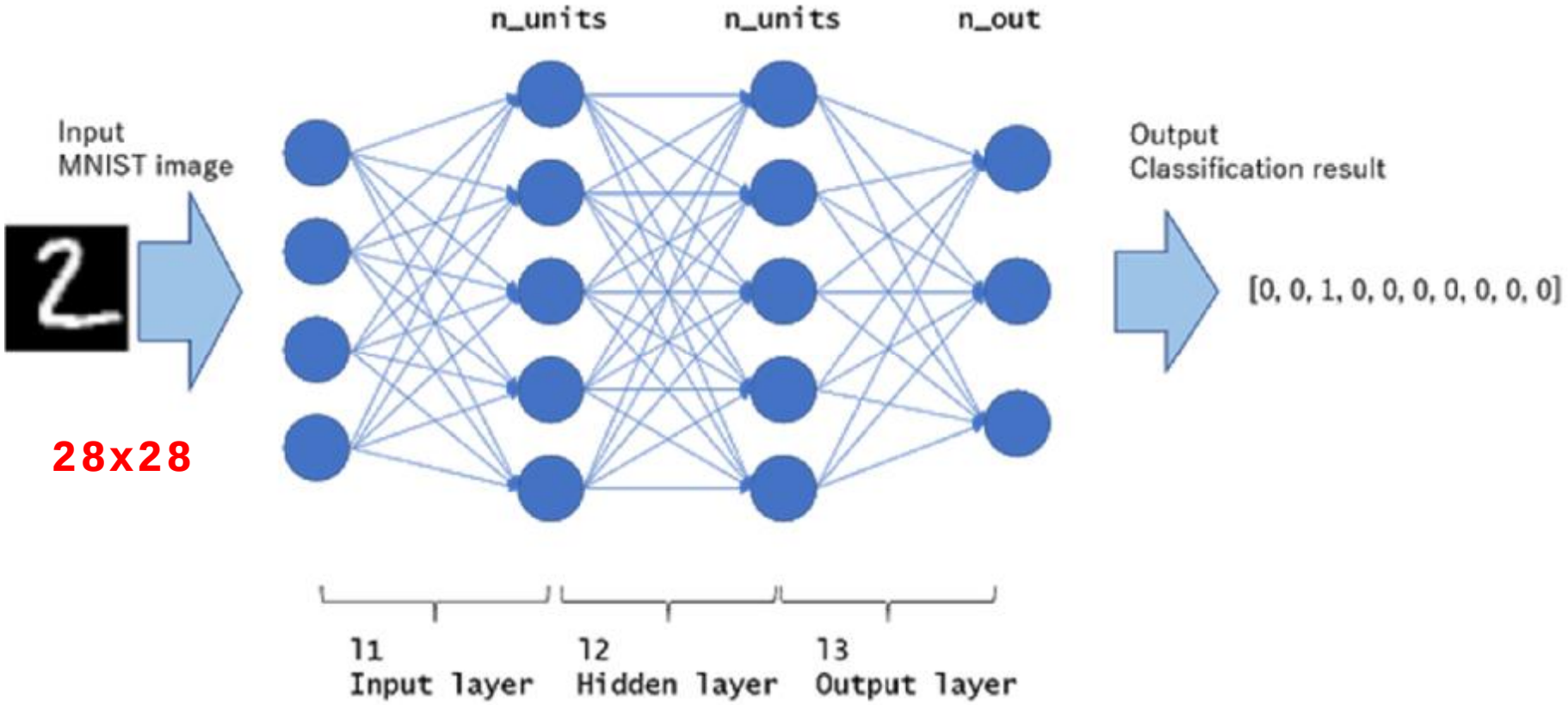
執行畫面

手寫板



結果

CNN 數字辨識


n_units
n_units
n_out
Input
MNIST image
28x28
Output
Classification result
[0, 0, 1, 0, 0, 0, 0, 0, 0, 0]
l1
Input layer
l2
Hidden layer
l3
Output layer

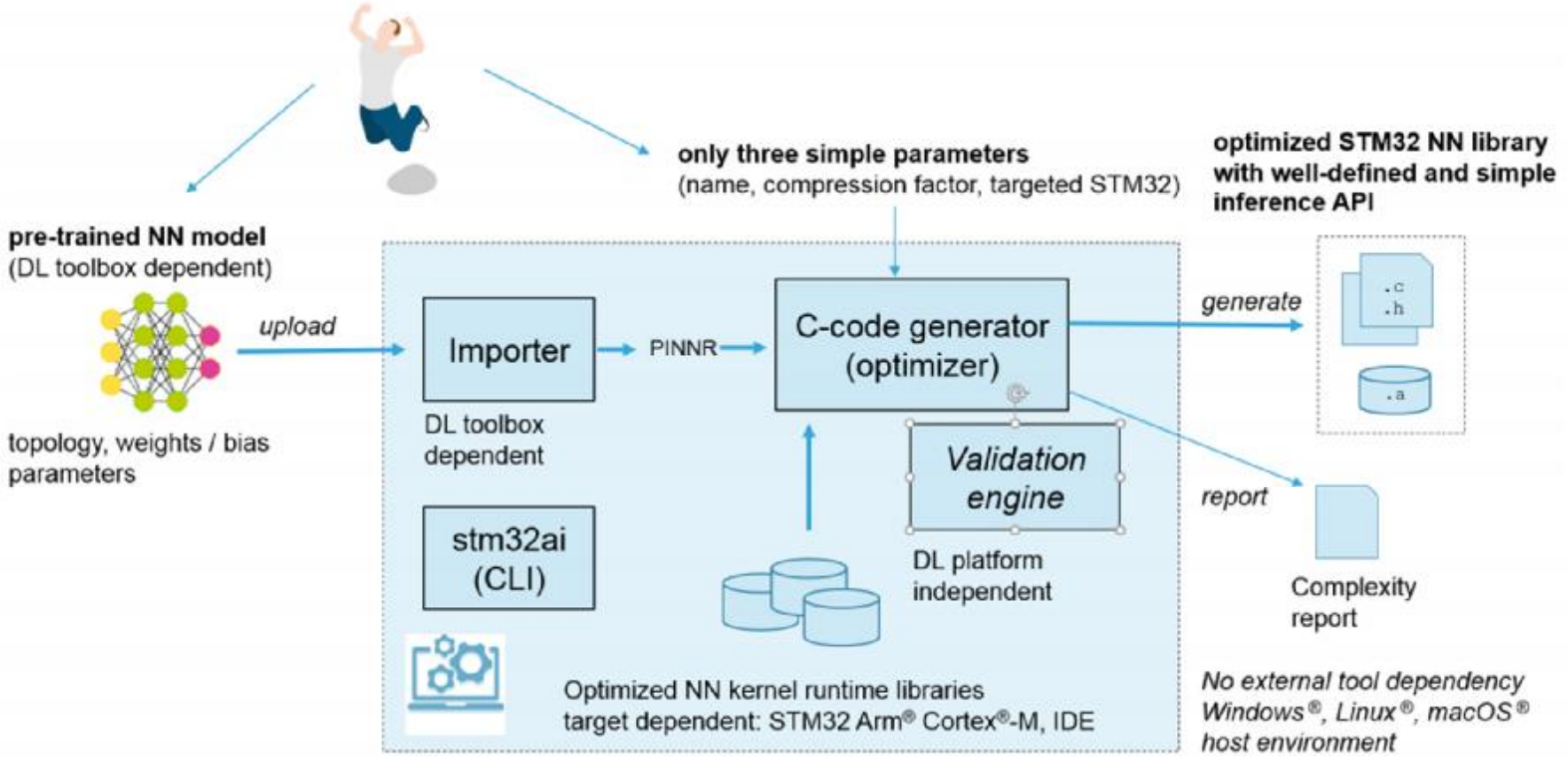
AI Model製作

model.h5

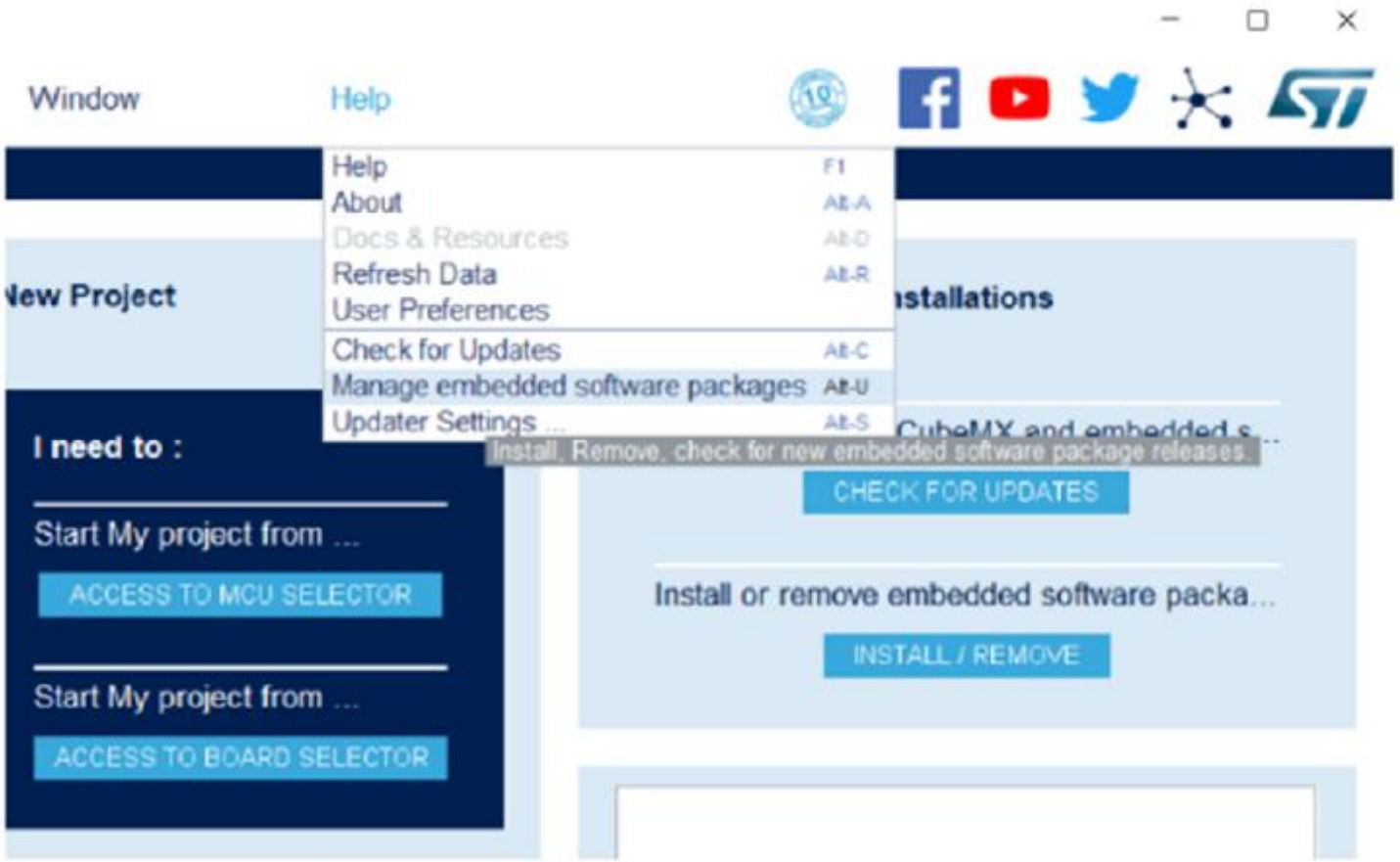
MNIST

X-CUBE-AI core engine

Figure 1. **X-CUBE-AI core engine**

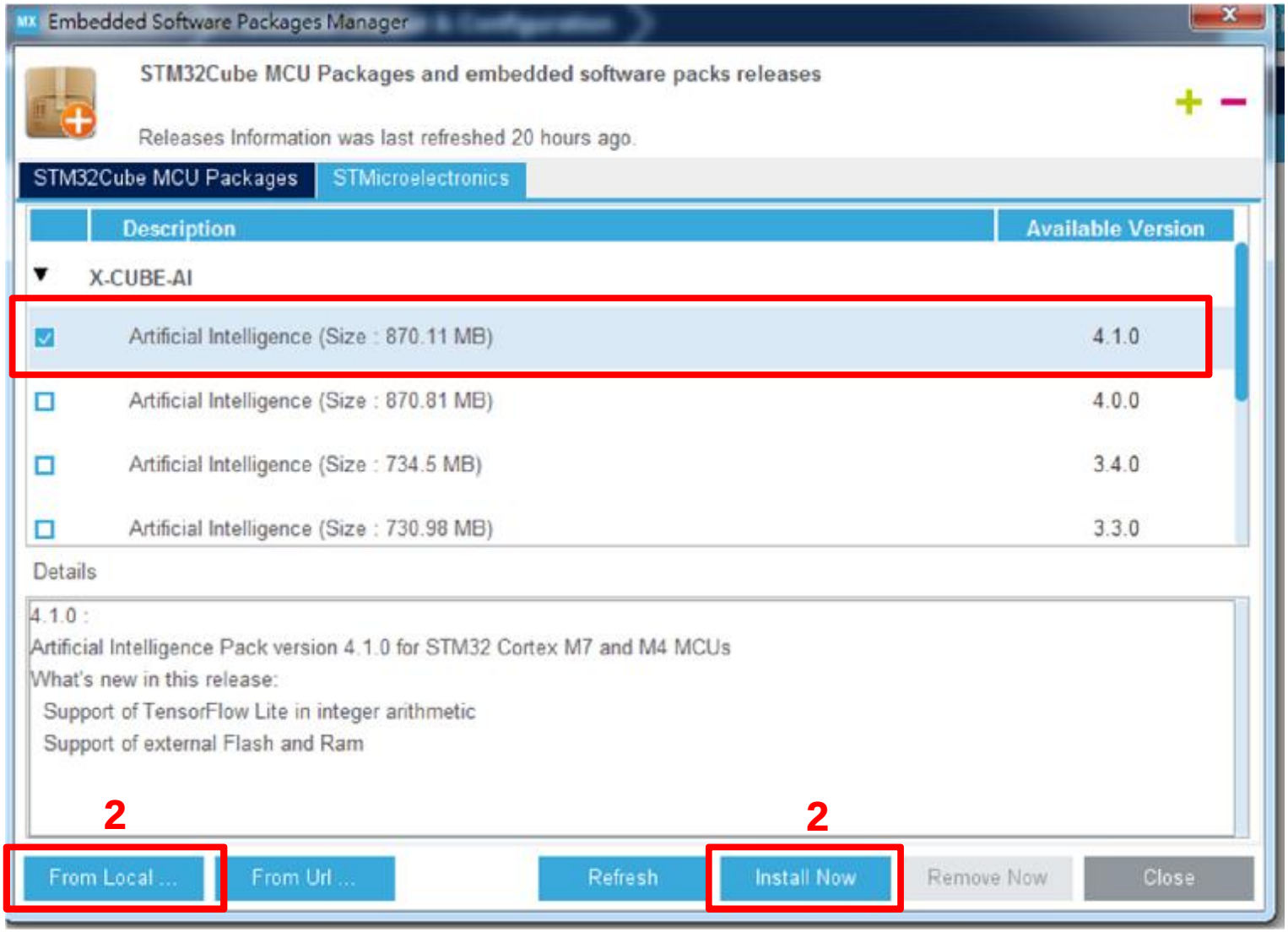


Install X-Cube-AI

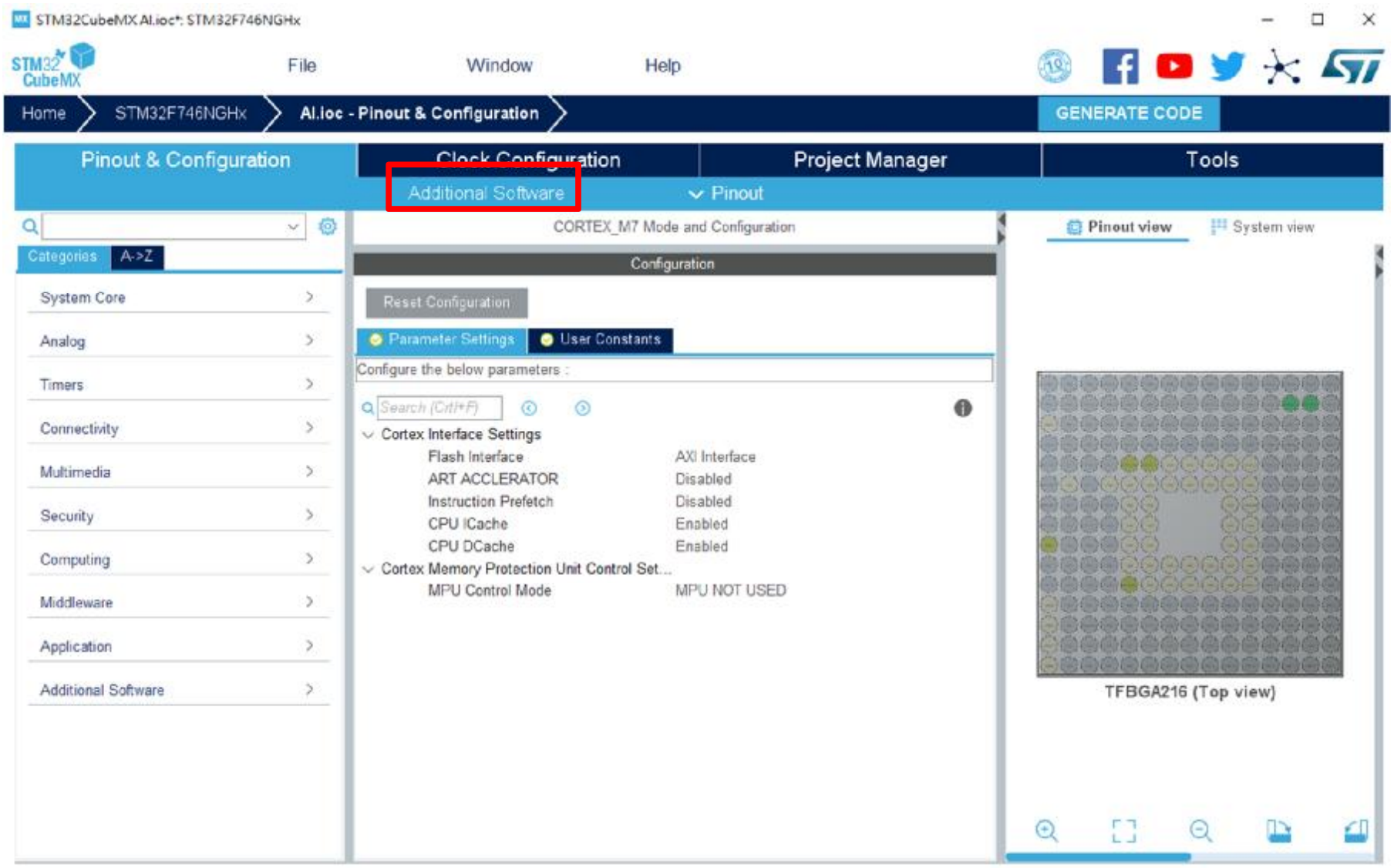


From the menu, select[Help]>[Manage embedded software packages] or directly click on the [INSTALL / REMOVE] button.

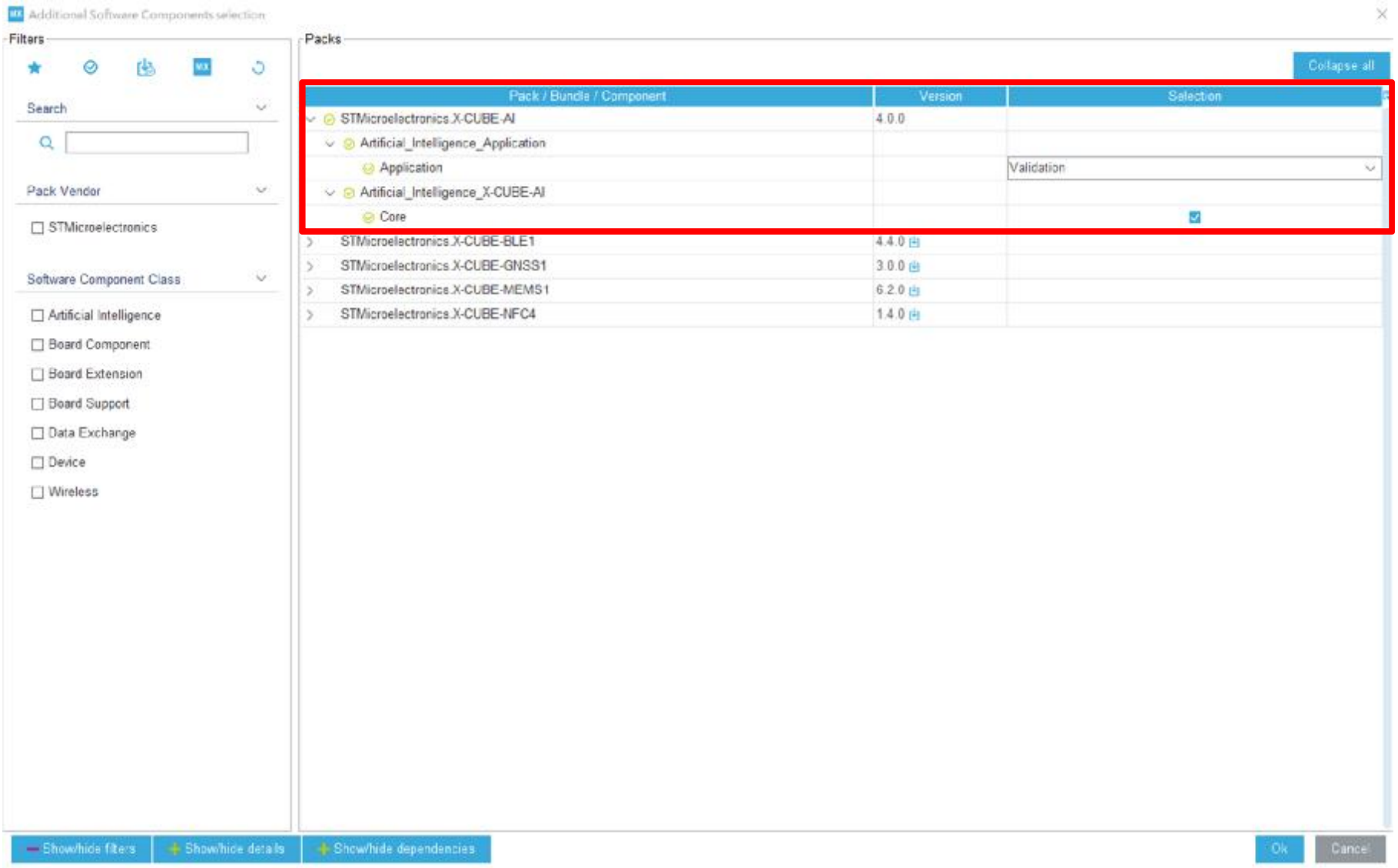
Install X-Cube-AI..



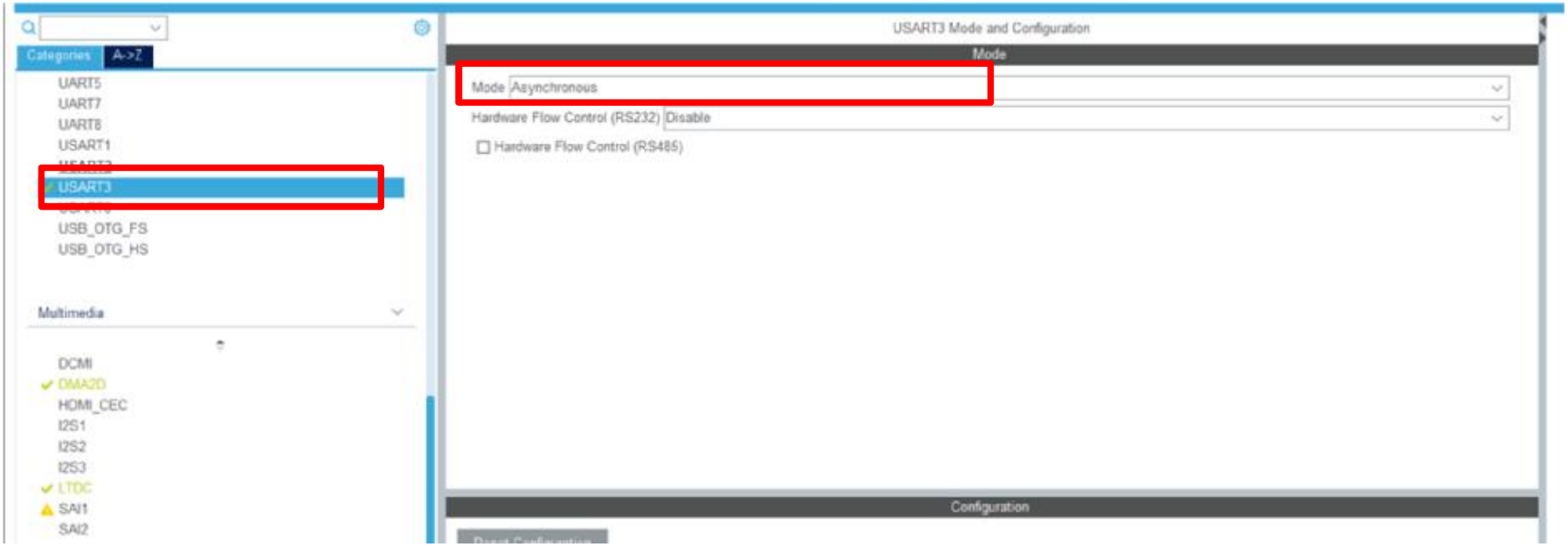
Cube Setting-1



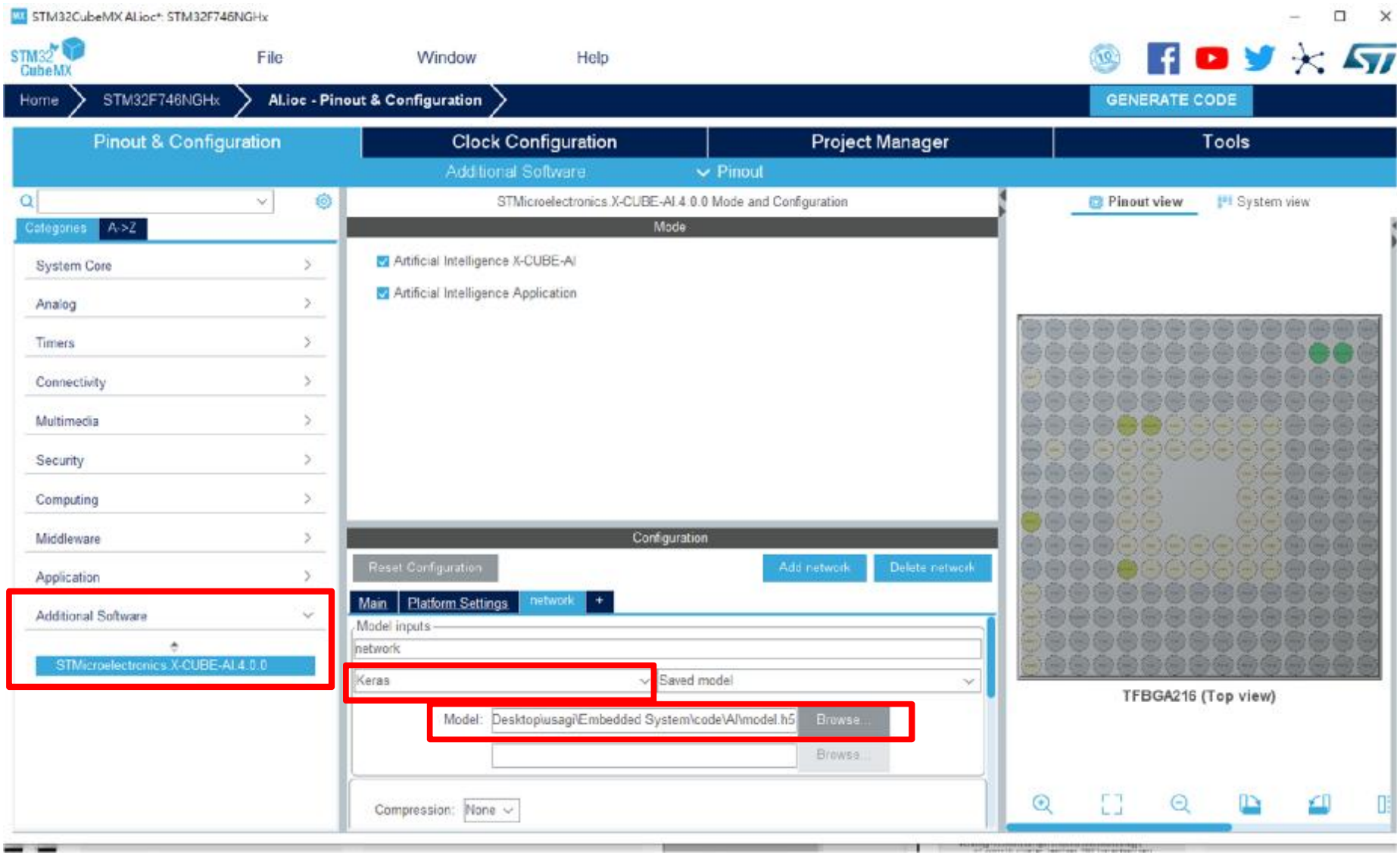
Cube Setting-2



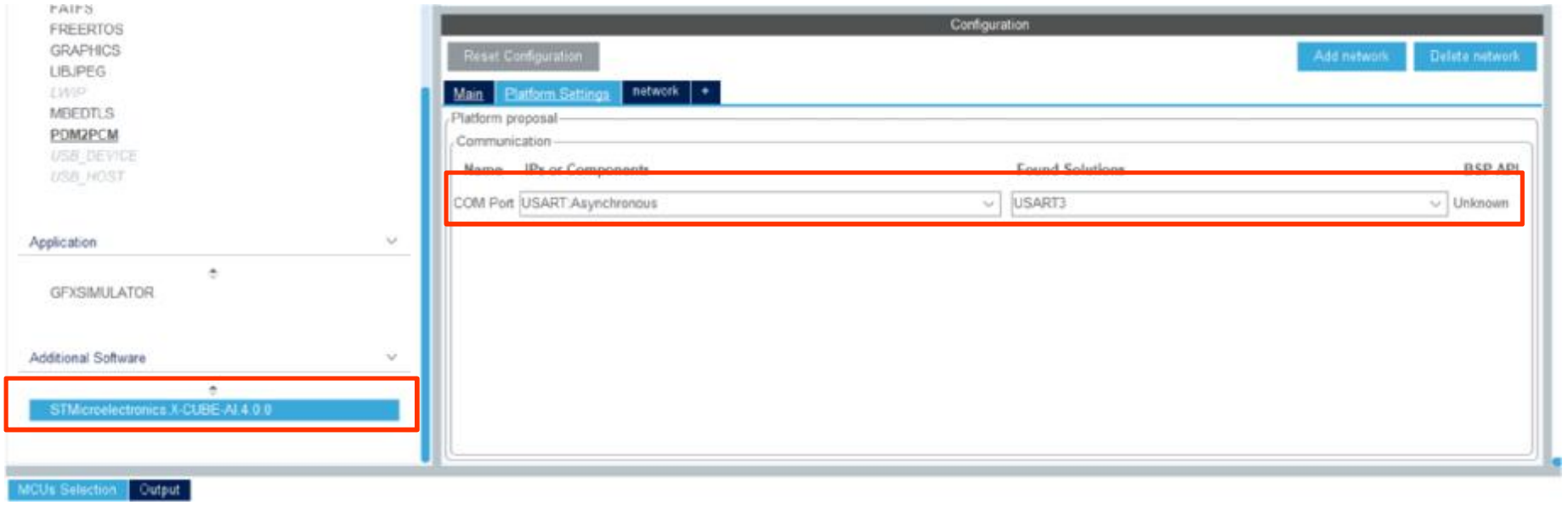
Cube Setting-3



Cube Setting-4



Cube Setting-5



Cube Setting-6

- 開啟**LTDC**
  - **FMC -> SDRAM1**
  - **DMA2D**
  - **LTDC**

AI run

- **AI_API_ENTRY ai_i32 ai_network_run(ai_handle network, const ai_buffer* input, ai_buffer* output)**

```
void MX_X_CUBE_AI_Process(void)
{
    aiValidationProcess();
    /* USER CODE BEGIN 1 */
    /* USER CODE END 1 */
}
```

AI init

- **AI_API_ENTRY ai_error ai_network_create(ai_handle* network, const ai_buffer* network_config)**
- **AI_API_ENTRY ai_bool ai_network_init(ai_handle network, const ai_network_params* params)**

```
void MX_X_CUBE_AI_Init(void)
{
    MX_UARTx_Init();
    aiValidationInit();
    /* USER CODE BEGIN 0 */
    /* USER CODE END 0 */
}
```

AI參考資料

- **Getting started with X-CUBE-AI Expansion Package for Artificial Intelligence (AI) : https://www.st.com/content/ccc/resource/technical/document/user_manual/group1/69/bb/ec/5d/78/16/43/ce/DM00570145/files/DM00570145.pdf/jcr:content/translations/en.DM00570145.pdf**
- **STMicroelectronics\X-CUBE-AI\4.0.0\Middlewares\ST\AI\SystemPerformance\Src\aiSystemPerformance.c**
- **https://www.st.com/content/st_com/en/stm32-ann.html**

LCD touch

- **stm32746g_discovery_ts.c**
- **uint8_t BSP_TS_Init(uint16_t ts_SizeX, uint16_t ts_SizeY)**
- **uint8_t BSP_TS_GetState(TS_StateTypeDef *TS_State)**

BSP

- stm32746g_discovery.c
- stm32746g_discovery_lcd.c
- stm32746g_discovery_ts.c
- stm32746g_discovery_sdram.c
- Components/common/ts.h
- Components/ft5336.c

會使用到的.c

- App_x-cube-ai.c
  - AI相關function
- **Stm32746g_discovery_lcd.c**
  - **LCD** 初始化、畫圖
- **stm32746g_discovery_ts.c**
  - 觸控

計分方式

1. 程式完成後請助教確認功能是否正確，並給予完成順序號。
2. 檢查後立即將所有程式壓縮7z檔後上傳至Moodle[繳交作業]，並在檔名依序寫上實習題目號碼、完成順序號、 學號。

   (檔名:Lab_3_No_xx_學號.7z)

1. 計分標準依完成順序及程式內容給分，若發現程式有互相抄襲狀況，該兩人分數皆為0分。

參考資料

- **Getting started with STM32F746G discovery software development tools.pdf**
- **STM32F746xx_HAL_User_Manual.chm**
- **Description of STM32F7xx HAL drivers.pdf**