# Models Results

* Architecture 4:
  + Conv2D(32)
  + MaxPooling2D
  + Conv2D(64)
  + MaxPooling2D
  + Conv2D(128)
  + MaxPooling2D
  + Flatten
  + Dense(5)
  + **Memory (Flash):** 374.27 KiB (no-comp), 367.77 KiB (x4), 365.58 KiB (x8)
  + **Memory (RAM):** 49.39 KiB (no-comp), 49.39 KiB (x4), 49.39 KiB (x8)
  + **TFLite Memory Test CubeAI (Flash):** 94.24 KiB (no-comp)
  + **TFLite Memory Test CubeAI (RAM):** 19.10 KiB (no-comp)
  + **STM32CubeAI:**  642 ms (average duration), 51375400 (average CPU cycles), 9.96 cycles/MACC
  + **Micro TensorArena size:** 43536 bytes
  + **MicroTFLite speed:** 20976017 CPU cycles
  + **GAPUINO speed:** 934891 (Cycles), 4664613 (Operations), 4.99 (Operations/Cycle)
  + **GAPUINO Memory:** 47532 (Bytes in L1), 106525 (Bytes in L2), 0 (Bytes in L3)

1. LR = 0.01, Batch = 1, Epochs = 20, SerialBalanced dataset:
   1. **Accuracy:** 0.2550
   2. **Loss:** 1.7893

* Architecture 9:
  + Conv2D(32, kernel size = (2,2), stride= (2,2))
  + Conv2D(64, kernel size = (2,2), stride = (2,2))
  + Conv2D(64, kernel size = (2,2), stride = (2,2))
  + Flatten
  + Dense(5)
  + **Memory (Flash):** 118.14 KiB (no-comp), 104.14 KiB (x4), 100.71 KiB (x8)
  + **Memory (RAM):** 46.27 KiB (no-comp), 46.27 KiB (x4), 46.27 KiB (x8)
  + **TFLite Memory Test CubeAI (Flash):** 30.02 KiB (no-comp)
  + **TFLite Memory Test CubeAI (RAM):** 17.94 KiB (no-comp)
  + **STM32CubeAI:** 124.58ms (average duration), 9966411 (average CPU cycles), 11.03 cycles/MACC
  + **Micro TensorArena size:** 18000 bytes
  + **MicroTFLite speed:** 3971615 CPU cycles
  + **GAPUINO speed:** 1348719(Cycles), 904197 (Operations), 0.6704 (Operations/Cycle)
  + **GAPUINO Memory:** 44620 (Bytes in L1), 43421 (Bytes in L2), 0 (Bytes in L3)

1. LR = 0.01, Batch = 8, Epochs = 20, SerialBalanced dataset:
   1. **Accuracy:** 0.3328
   2. **Loss:** 1.5864

* Architecture 10:
  + Conv2D(32)
  + BatchNormalization()
  + ReLU()
  + MaxPooling2D
  + Conv2D(64)
  + BatchNormalization()
  + ReLU()
  + MaxPooling2D
  + Conv2D(64)
  + BatchNormalization()
  + ReLU()
  + MaxPooling2D
  + Flatten
  + Dense(5)
  + **TFLite Memory Test CubeAI (Flash):** 57.05 KiB
  + **TFLite Memory Test CubeAI (RAM):** 33.36 KiB
  + **STM32CubeAI:** 164.875 ms (average duration), 13189977 (average CPU cycles), 2.86 cycles/MACC
  + **Micro TensorArena size:** 66336 bytes
  + **MicroTFLite speed:** 33954102 CPU cycles

1. LR = 0.01, Batch = 8, Epochs = 20, SerialBalanced dataset:
   1. **Accuracy:** 0.2867
   2. **Loss:** 1.7149

* Architecture 12:
  + TimeDistributed(Conv2D(64))
  + TimeDistributed(BatchNormalization)
  + TimeDistributed(ReLU)
  + TimeDistributed(MaxPooling2D)
  + TimeDistributed(Conv2D(128))
  + TimeDistributed(BatchNormalization)
  + TimeDistributed(ReLU)
  + TimeDistributed(MaxPooling2D)
  + TimeDistributed(Conv2D(128))
  + TimeDistributed(BatchNormalization)
  + TimeDistributed(ReLU)
  + TimeDistributed(MaxPooling2D)
  + TimeDistributed(Flatten)
  + LSTM()
  + Dense(5)

1. Cells = 8, LR = 0.01, Batch = 10 (size 1,32,32,3), Epochs = 20, SerialBalanced dataset:
   1. **Accuracy:** 0.3928
   2. **Loss:** 1.9709

* Architecture 13:
  + Conv2D(32)
  + BatchNormalization()
  + SpatialDropout2D(0.5)
  + ReLU()
  + MaxPooling2D
  + Conv2D(64)
  + BatchNormalization()
  + SpatialDropout2D(0.5)
  + ReLU()
  + MaxPooling2D
  + Conv2D(64)
  + BatchNormalization()
  + SpatialDropout2D(0.5)
  + ReLU()
  + MaxPooling2D
  + Flatten
  + Dense(5)
  + **TFLite Memory Test CubeAI (Flash):** 57.05 KiB (no-comp)
  + **TFLite Memory Test CubeAI (RAM):** 33.36 KiB (no-comp)
  + **STM32CubeAI:** 164.875 ms (average duration), 13189977 (average CPU cycles), 2.86 cycles/MACC
  + **MicroTFLite speed:** 33872661 CPU cycles
  + **Micro TensorArena size:** 66336 bytes

1. LR = 0.01, Batch = 8, Epochs = 20, SerialBalanced dataset:
   1. **Accuracy:** 0.4022
   2. **Loss:** 1.5317