Choose the Right Hardware

Proposal Template

Scenario 1: Manufacturing

Client Requirements and Potential Hardware Solution

Look through the scenario and find any relevant client requirements. Then, suggest a potential hardware type and explain how this hardware would satisfy each of the requirements.

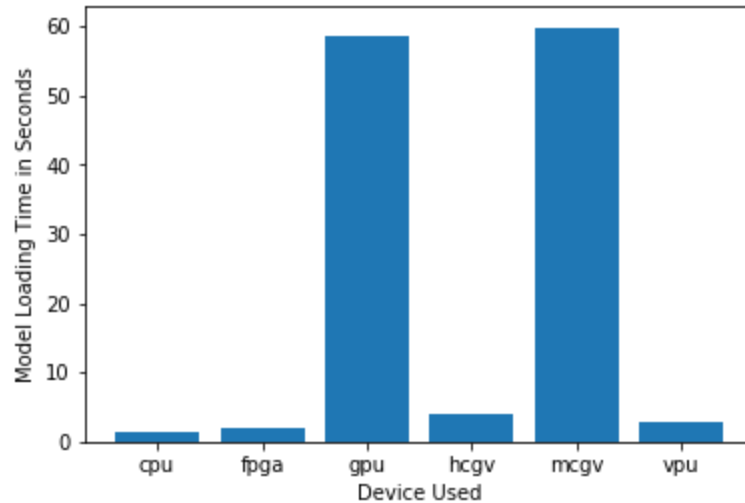| Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA) |
|---|
| *FPGA* |

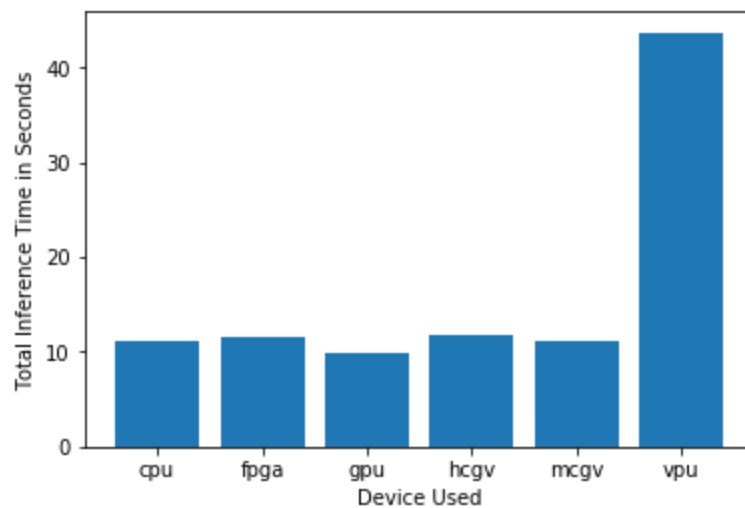| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
Mr. Vishwas requires the image processing task to be completed five times per second compared to the current 30 - 35 FPS of the current system	*FPGAs are faster than CPU and good for accomplishing this task.*
Mr. Vishwas wants the system to be flexible so that it can be reprogrammed to quickly detect flaws in different chips designs.	*FPGA meets this requirement as the name itself suggests (field Programmable Gate Arrays), it is programmable and can be reprogrammed to me the requirement of different chips design. I like to point out too that it is very easy to reprogramme FPGAs as they are configured at each power on. So it is the best for the client requirement.*
The client consider this to be a significant requirement that should last 5 - 10 years and finance is not a bottleneck for them as they have plenty of revenue to install quality system to address the problem	*The cost of installing FPGA is significantly more than using IGPU, or VPU. But this is not a problem for Naomi Semiconductors. They are willing to make this investment now and hope to increase their revenue from the installation of the system.*

Queue Monitoring Requirements

Maximum number of people in the queue	*2*

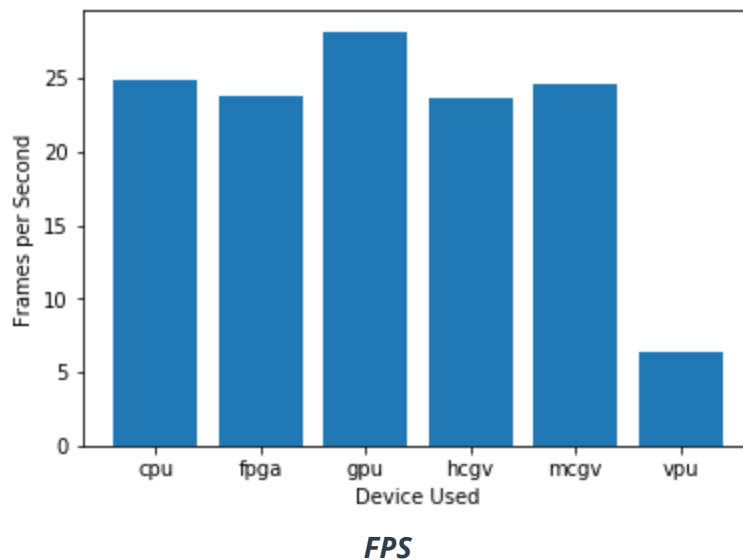| Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

After you've tested your application on all four hardware types (CPU, IGPU, VPU, and FPGA), copy the matplotlib output showing the comparison into the spaces below. You should have three graphs (for model load time, inference time, and FPS).

Model Load Time

Inference Time

FPS

Final Hardware Recommendation

Now synthesize your points from above and provide a brief write-up describing why the chosen hardware is the best choice for this scenario. Be sure to discuss the client's requirements, the test results, and how these relate to one another (e.g., perhaps one of the devices performed better than the rest, but does not meet one of the client's requirements).

Write-up: Final Hardware Recommendation
FPGA is a good choice for this scenario along with meeting the client requirement, we see also that the inference time is low, the model load time is also very low. The FPS is not as much as CPU and GPU but it can still serve the client requirement and not up to the 30 - 35 that the camera records. Also, we can see that there are marginal difference between the FPS of the other devices., with VPU being the lowest. *I would still recommend FPGA for the client because it satisfies the other requirement for the system that is flexible and that can be reprogrammed and used for running inferences on new designs.*

Scenario 2: Retail

Client Requirements and Potential Hardware Solution

Look through the scenario and find any relevant client requirements. Then, suggest a potential hardware type and explain how this hardware would satisfy each of the requirements.

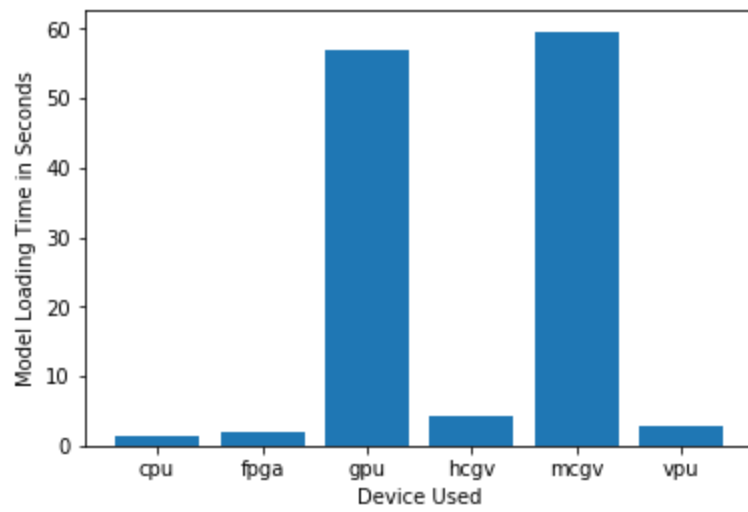| Which hardware might be most appropriate for this scenario?
(CPU / IGPU / VPU / FPGA) |
|---|
| *CPU* |

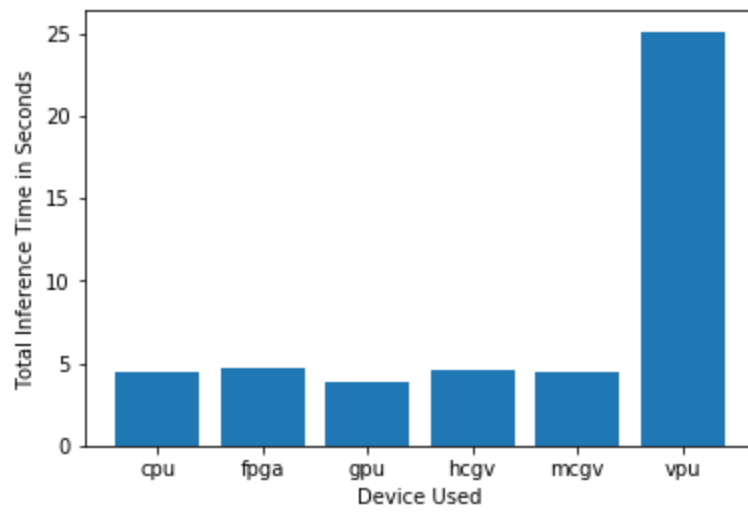| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The store already have modern computers that are not optimally utilized	*The CPU of the computers that are currently available in the store can serve this purpose because currently they are only used for performing tasks that are not computationally demanding. The new system to be installed can take advantage of the current CPU to achieve the task.*
Mr Lin already had lots of investment in paying salaries and adequately compensating his employees. He does not have the money to invest in additional hardwares.	*Since Mr. Lin won't want to invest more money on additional hardware, we do not need to bother about installing GPUs or FPGA which will incur additional cost. The CPU in the systems currently available with minimal utilization should be use for building the Edge system for Mr. Lin*
He would like to save as much as possible on electricity bill	*Energy consumption is an import requirement here. To avoid incurring huge electricity bills the system should consume as minimal energy as possible*

Queue Monitoring Requirements

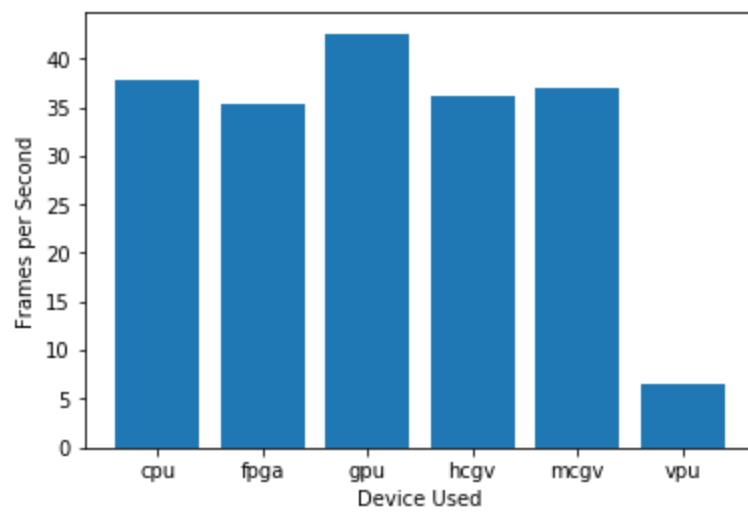|	
Maximum number of people in the queue	*2*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

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Inference Time

FPS

UDACITY

Final Hardware Recommendation

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Write-up: Final Hardware Recommendation
The CPU is the most ideal device for this scenario. It has the lowest inference time, lowest model load time and highest FPS. In addition it satisfies the client requirements well. The client does not have to spend extra finance to acquire hardware. Since the system is using already existing hardware there is little or no extra cost for electrical bills.

Scenario 3: Transportation

Client Requirements and Potential Hardware Solution

Look through the scenario and find any relevant client requirements. Then, suggest a potential hardware type and explain how this hardware would satisfy each of the requirements.

Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA)
VPU

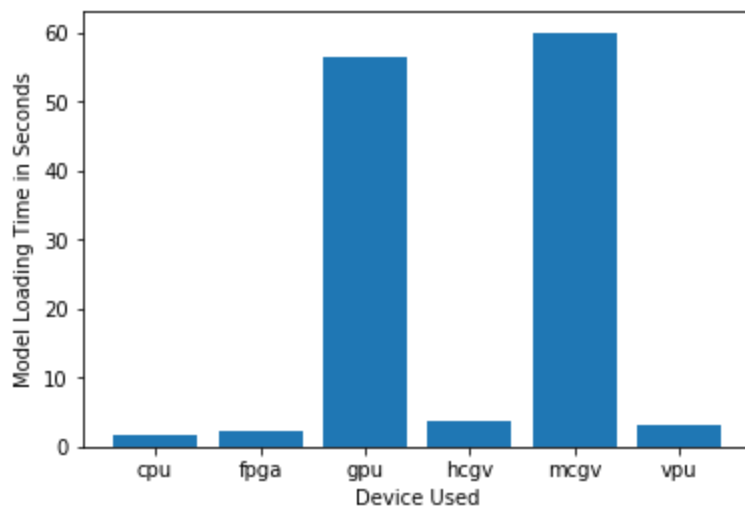| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Example requirement: The client requires a tiny device to be connected to their CPU—and their budget is only about $100 for each device.	*Example explanation:* VPU or NCS2 is only about 27.40 mm in size and would fit in the price range.
The Ms Lean requires a system that can quickly redirect crowds in the write manners	*externaGPU that will be attached to the already existing system will be able to deliver the processing speed required by the client.*
Ms Lean budget only allows for $300 per machine	*NCS2 will be more cost effective for Ms Lean as it is usually between $60 to $70 so it is within the budget of Ms Lean.*
The client would like to save as much as possible on both hardware and future power requirements	*Instead of building a system from scratch, a VPU/NCS2 can be attached to the pre-existing system. The NCS2 is mean to be low-power devices that makes it easy to*

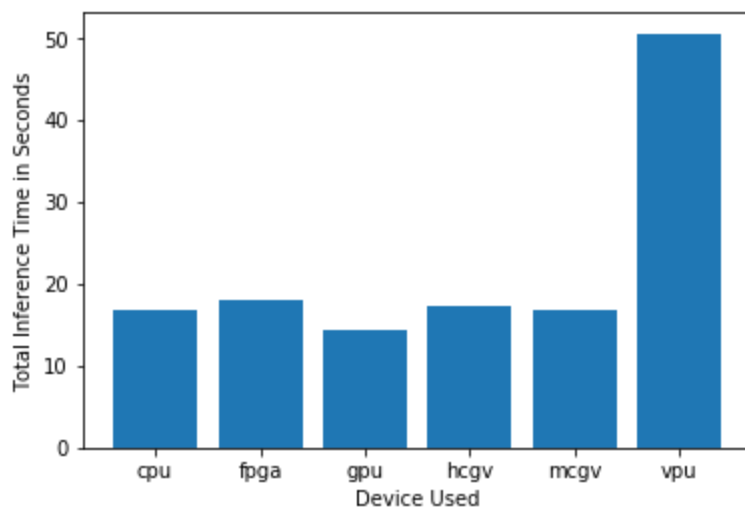|	deploy at the edge, although there are some trade off with performance.

Queue Monitoring Requirements

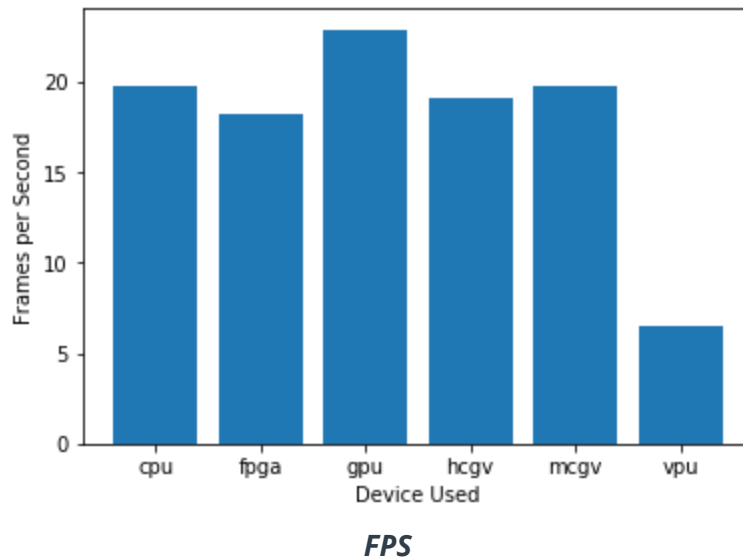| Maximum number of people in the queue	2
Model precision chosen (FP32, FP16, or Int8)	FP16

Test Results

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Final Hardware Recommendation

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Write-up: Final Hardware Recommendation
Based on my initial proposal, the VPU performs poorly than the other devices. It has significantly low FPS and high model inference time, although the load time is pretty low compared to the other devices. Other devices like CPU and FPGA would have been a better choice for the client, but resource constraints are bottlenecks. The choice of an external GPU would not satisfy the client requirement for saving on power. *The pre-existing PCs are already over utilized, and the client has limited funds to invest in purchasing additional hardware.* *In this case the VPU is not necessarily the best device for the problem, but it is what the client can afford.*