Choose the Right Hardware

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.

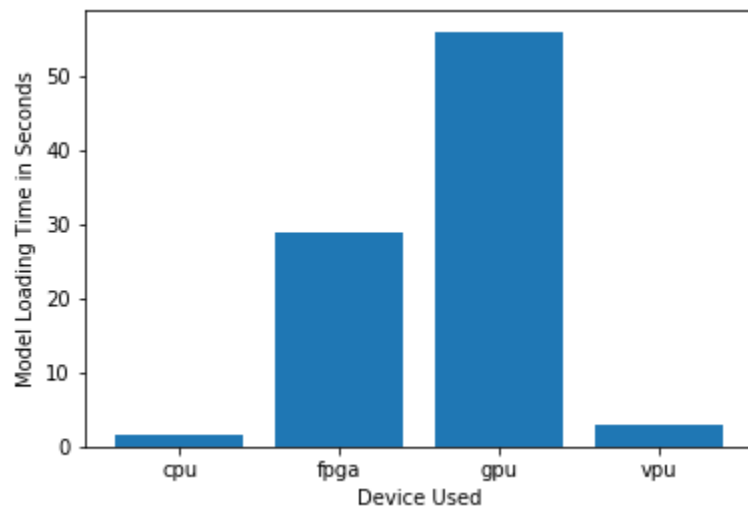| Which hardware might be most appropriate for this scenario? (CPU / IGPU / VPU / FPGA) |
|---|
| *FPGA* |

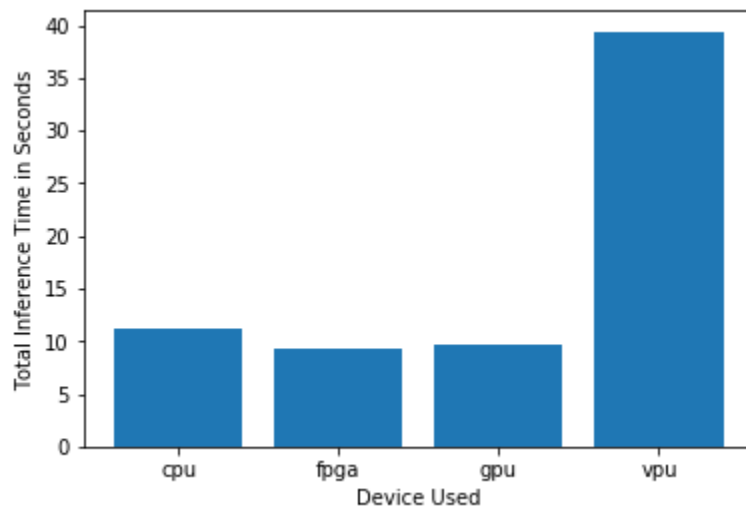| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
Video is at 30-35 FPS on the camera and the client would like the image processing task to be completed five times per second	FPGA could satisfy this requirement, and perform better than other devices regarding FPS
The system would need to be able to run inference on the video stream very quickly.	FPGA perform better than other devices regarding inference time
The system would also need to be flexible so that it can be reprogrammed and optimized to quickly detect flaws in different chip designs	FPGA is designed for programmable system, could be programmed easily
Last for at least 5-10 years, although no restriction in cost for one time investment	FPGA has good quality and durability

Queue Monitoring Requirements

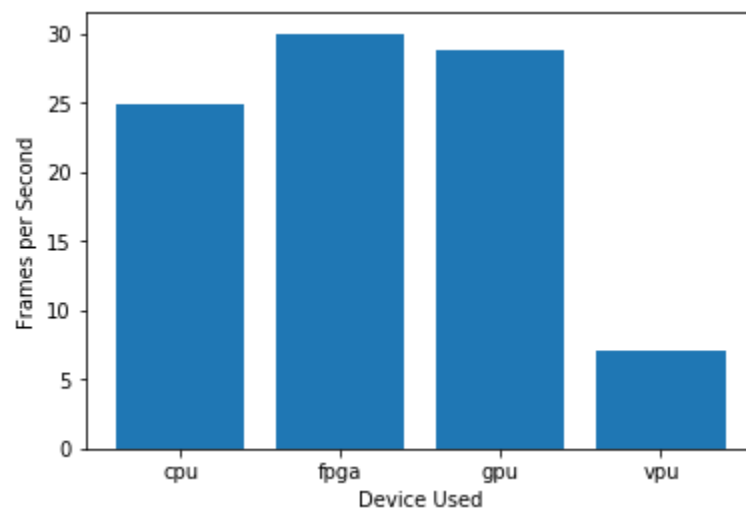|	
Maximum number of people in the queue	*5*
Model precision chosen (FP32, FP16, or Int8)	*FP32*

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

UDACITY

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 the choice for this scenario. Only FPGA and GPU could satisfy the FPS requirements (>30), and FPGA has much less loading time than GPU.

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.

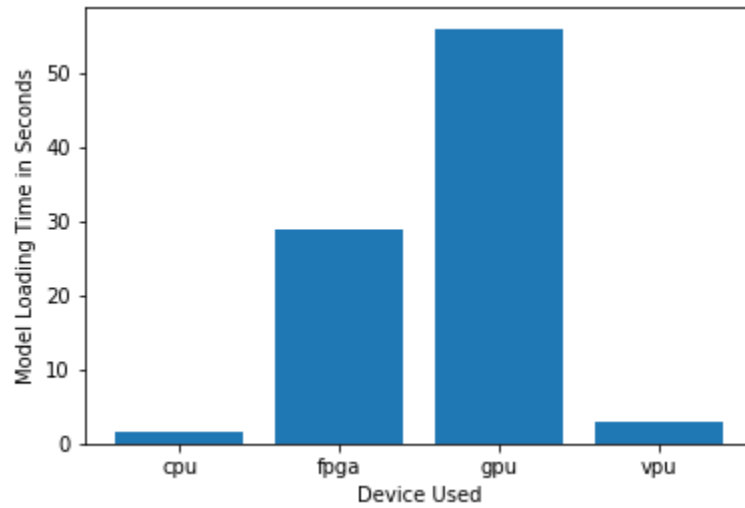| Which hardware might be most appropriate for this scenario?
(CPU / IGPU / VPU / FPGA) |
|---|
| *CPU* |

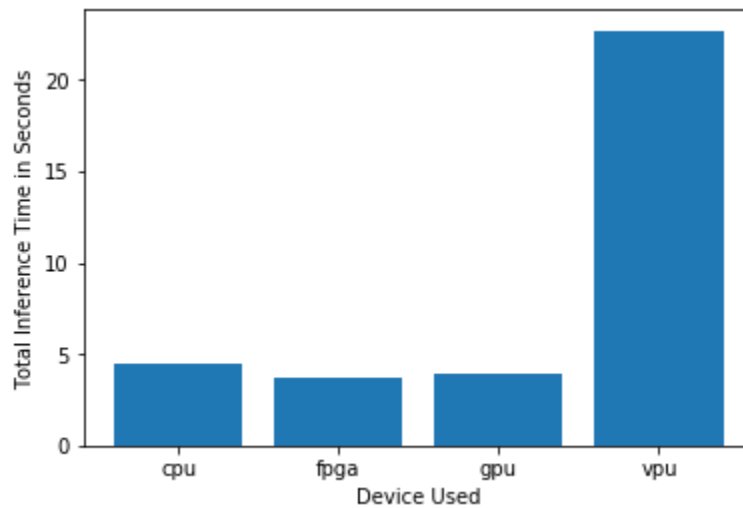| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?
The client does not have much money to invest in additional hardware, and would like to reduce power consume also to reduce electric bill.	Current CPU still have capacity, may be able to support this task without adding extra hardware and
The client already have many modern computers, each of which has an Intel i7 core processor. Currently these processors are only used to carry out some minimal tasks that are not computationally expensive.	No additional hardware is needed.
The total number of people in the checkout queue ranges from an average of 2 per queue (during normal daily hours) to 5 per queue (during rush hours).	*I7 core CPU is enough to support this amount of computation.*

Queue Monitoring Requirements

Maximum number of people in the queue	*5*

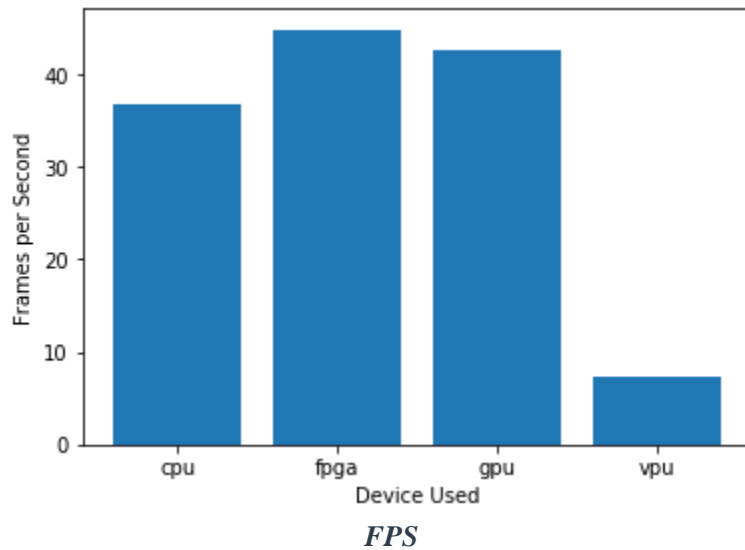| Model precision chosen (FP32, FP16, or Int8)	*FP16*

Test Results

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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
CPU   *Current CPU has bandwidth to support the task since the new task is not computationally expensive. This way do not need extra hardware and could reduce the cost most effectively, comparing with other methods..*

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

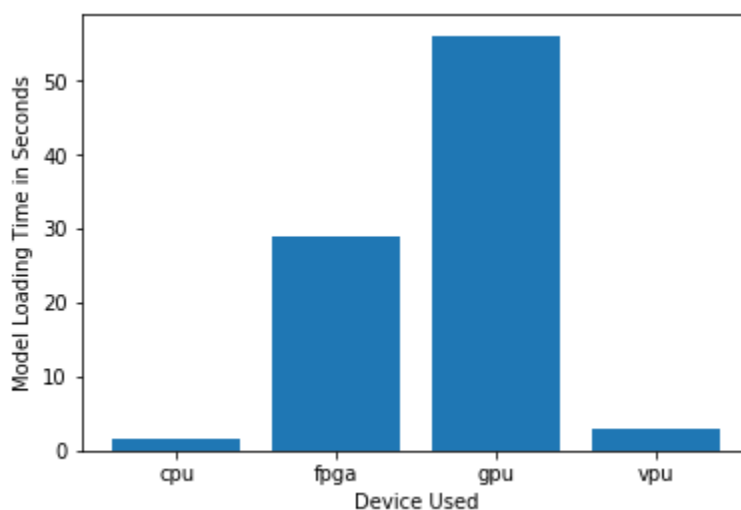| Requirement Observed (Include at least two.)	How does the chosen hardware meet this requirement?

UDACITY

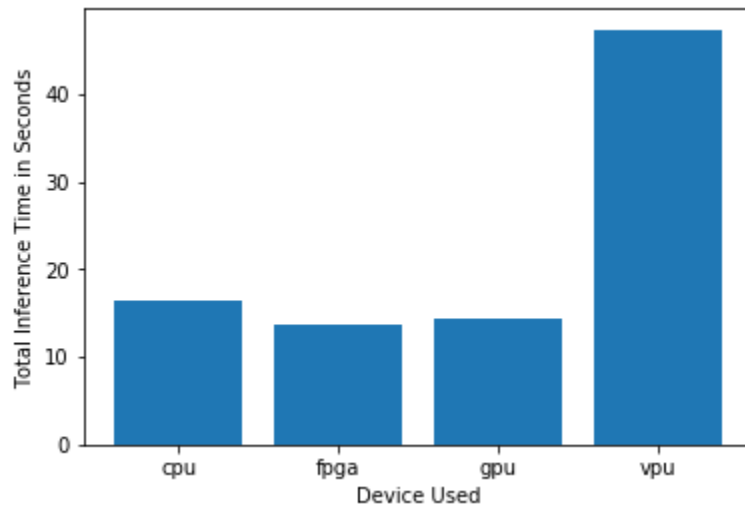| In peak hours they currently have over 15 people on average in a single queue, 7 CCTV cameras on the platform	*All devices could handle 15 people in queue from 7 sources. VPU could accelerate CPU.*
The CPUs in these machines are currently being used to process and view CCTV footage for security purposes and no significant additional processing power is available to run inference.	*VPU consume less power compared with FPGA, is typically an usb or similar small attachment device.*
Budget allows for a maximum of $300 per machine, save as much as possible both on hardware and future power requirements.	*VPU could be in this range, and less power consume for future.*

Queue Monitoring Requirements

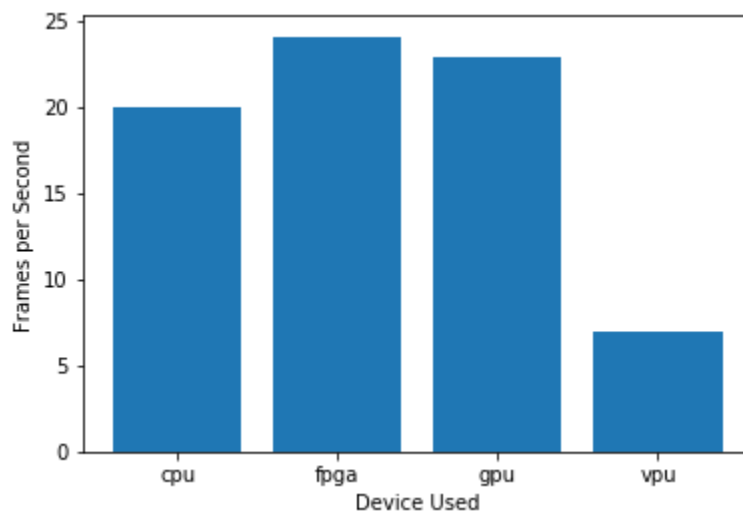| Maximum number of people in the queue	*15*
Model precision chosen (FP32, FP16, or Int8)	*FP16*

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
VPU *VPU, GPU and FPGA could handle the volume the people in one frame in busy hours, but only VPU could satisfy the price requirement for hardware and low power consume requirement for future. The inference time and fps won't be an issue since the train is around 2min~5min/once, the performance of VPU is enough for this purpose.*