

Meat-Based Graphics Pipelines

Will BL

March 2023

Abstract

Turns out humans can draw things and see things in images sometimes. Are they better than computers?

1 Introduction

GPUs have always been important in computer graphics. Recently, they have been used in more general forms of computation: in the past year there has been an explosion¹ in 'AI' text-to-image models. These neural networks, though they have very impressive capabilities, regardless have far-reaching consequences for their use. They can only be used by those who have access to modern GPUs². They can be used to create convincing misinformation³. Their creators have also been accused of wholesale copyright infringement⁴. In addition, GPUs are getting more and more power-hungry. This makes usage of them not only for AI, but also for regular graphics programming, possibly unethical, as global warming continues to have horrible effects on the planet. Can we do better?

The human brain is a meat-based hardware with magic computational powers. Recent experiments show that it may even show some signs of intelligence, though this is likely overstated. The brain has a large inbuilt GPU⁵: a possible next-generation, low-energy, ethical graphics processor?

2 Prior Work

Image manipulation via brain processing⁷ actually has a long history. However, it doesn't count because it wasn't done by TechBros.

The general idea of using human meat as a computer extension has been suggested before[L W99].

¹Metaphorically.

²Gatekeep.

³Gaslight.

⁴Girlboss.

⁵In the occipital lobe.⁶

⁶In the back.

⁷'Art' being the term of art.

3 Experiments

3.1 What is this "brain" thing anyway?

The ancient Greeks said, "Know Thyself"⁸. We must seek an understanding of brain. How do we understand brain? What is it, and why? Neuroscientists would say something. Psychologists would say something else. Their disagreement shows that both fields are contradictory and therefore worthless. We must instead do what any good computer scientist would do: ~~run Doom on it~~ benchmark it.

An experiment was devised to determine the computational power of the brain's GPU. The brain was first exposed to a GLSL shader, and was then tasked with creating the image it creates. The time taken for the brain to produce the output was capped at 60 seconds.

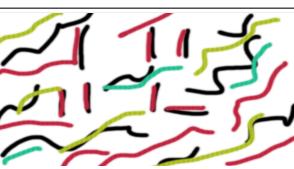
3.1.1 GLSL Shader

The following GLSL shader code was used:

```
uniform float u_time;

void main() {
    gl_FragColor = vec4(1.0, 1.0, 1.0, 1.0);
}
```

3.1.2 Results

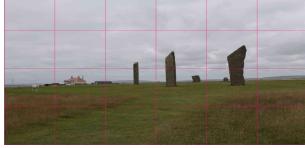
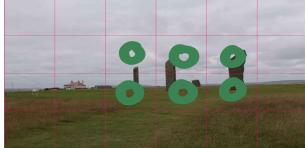
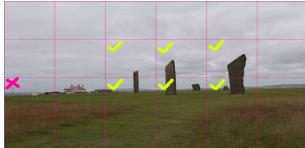
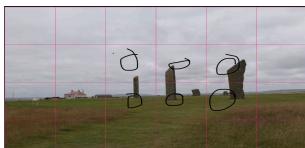
Time taken (seconds)	Output
60	
60	
60	

⁸Well presumably they said it in Greek.

3.2 Object recognition

It turns out that the brain has inbuilt, hardware-enhanced support for object recognition in images⁹. We tested the capabilities of the brain in this task by giving it CAPTCHA-style tests.

3.2.1 Results

	Find Stone Circles	Find Waterloo Station	Find Stone Circles
Image			
Correct			
Brain 1			
Brain 2			
Brain 3			

3.3 Mentally Unstable Diffusion: text-to-image with brain hardware

We've all heard too much about 'AI' recently. Can we replace it entirely with brain¹⁰? We came up with some 'prompts' and fed them into some human brains. The brains were given exactly 60 seconds to produce an image. The resulting images were then rated subjectively¹⁵ by a panel of critics¹⁶.

⁹This was not mentioned as a feature in the documentation.

¹⁰Those of us who wish to do so call ourselves "The Knights who say 'NI'¹¹!"

¹¹Natural¹²Intelligence

¹²i.e.¹³Non-Artificial

¹³ille est¹⁴

¹⁴That is

¹⁵This is still science, I swear.

¹⁶Which consisted of me.

The prompt used was:

```
an apollo astronaut riding a horse past the  
great pyramids of giza high quality highest quality  
trending on artstation sharp image no noise
```

Note that the prompt says 'the great pyramids of giza'. This was totally on purpose to see how it affected the result, and not at all a mistake caused by me forgetting that there is only one 'Great Pyramid of Giza'¹⁷.

3.3.1 Results

Output	Rating

	*

¹⁷The other ones, though in Giza, aren't all that Great.

4 Discussion

4.1 Experiment 1

Brains are awful at compiling and processing GLSL shaders. None of them produced the correct output, and they all took the maximum available time of 60 seconds to actually produce any result. It would appear they are not useful for real-time applications such as gaming. Games should stick to the realm of cold metal machines, where they belong - not in the imagination of human beings.

4.2 Experiment 2

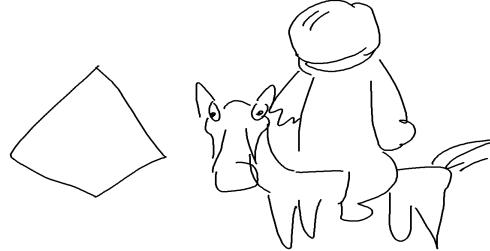
Brains are inconsistently good at recognising objects. They performed well at finding stone circles (circles of stones) and at finding stone circles (circles of stone). All brains thought they could see Waterloo station in an image of what is clearly Liverpool Street station. This disparity opens up many questions:

- Are brains only able to reliably detect objects which can be described as 'stone circles'?
- Are brains only able to reliably detect non-transportation-related objects? What does this imply for human driving of vehicles?
- Would brains get lost if trying to get around London?

4.3 Experiment 3

Some brains were better than others at creating an image from a text prompt. But wow, look at that horse's face in the third one! That thing looks awesome!

5 Conclusion



References

[L W99] L. Wachowski L. Wachowski. *The Matrix*. Film. 1999.