



Model Response Comparison

Prompt P1: General knowledge

Prompt: Explain what OSI model is in one paragraph.

Gemini Response	Gemma3 (4B) Response
The OSI (Open Systems Interconnection) model is a conceptual framework that standardizes the functions of a telecommunication or computing system in terms of abstraction layers. It divides the complex process of network communication into seven distinct layers, each responsible for a specific set of tasks, allowing different hardware and software to interoperate seamlessly by defining how data is transmitted from an application on one computer to an application on another, across a network.	The Open Systems Interconnection (OSI) model is a conceptual framework that divides network communication into seven distinct layers, each responsible for a specific aspect of the process. These layers – Physical, Data Link, Network, Transport, Session, Presentation, and Application – work together to enable devices to communicate over a network. It's a standardized model used for understanding and troubleshooting network problems, as it breaks down the complex process of data transmission into manageable components, allowing for clear definitions and interoperability between different network technologies.

Prompt P2: Reasoning

Prompt: If a train leaves at 10, travels 300km at 100kmh, when does it arrive.

Gemini Response	Gemma3 (4B) Response
Here's how to solve this problem:	Here's how to calculate the arrival time: * Calculate the travel time: $\text{Time} = \text{Distance} / \text{Speed} = 300$

Gemini Response	Gemma3 (4B) Response
<p>1. Calculate the travel time:</p> <p>* Formula: Time = Distance / Speed</p> <p>* Calculation: Time = 300 km / 100 km/h = 3 hours</p> <p>2. Determine the arrival time:</p> <p>* Departure time: 10:00</p> <p>* Travel time: 3 hours</p> <p>* Arrival time: 10:00 + 3 hours = 13:00</p> <p>Therefore, the train arrives at 13:00 (or 1 PM).</p>	<p>km / 100 km/h = 3 hours.</p> <p>* Add the travel time to the departure time: The train leaves at 10:00 and travels for 3 hours, so it arrives at 13:00 (1:00 PM).</p> <p>Therefore, the train arrives at 1:00 PM.</p>

Prompt P3: Code generation

Prompt: Generate a Python function that sorts a list using bubble sort.

Gemini Response
<pre>python
def bubble_sort(data):
 """
 Sorts a list of comparable elements using</pre>
<p>Explanation of the Bubble Sort Algorithm:</p>

Gemini Response

1. Initialization:

- The function takes a list `data` as input.
- `n` stores the number of elements in the list.
- `sorted_data = data[:]` creates a shallow copy of the input list. This is important because it ensures the original list is not modified.

2. Outer Loop:

- `for i in range(n):` This loop iterates `n` times. In each pass of the outer loop, at least one element is moved to its correct position.

3. Inner Loop:

- `for j in range(0, n - i - 1):` This loop iterates through the unsorted portion of the list.
- `n - i - 1` is the upper bound because the last `i` elements are already sorted and in their correct positions.
- `if sorted_data[j] > sorted_data[j + 1]:` This is the core comparison. If the current element is greater than the next element, they are swapped.

4. Swapping:

- `sorted_data[j], sorted_data[j + 1] = sorted_data[j + 1], sorted_data[j]` This is a Pythonic way to swap two elements in a list.

5. Return:

- `return sorted_data` The function returns the newly created sorted list.

How Bubble Sort Works (Conceptual Example):

Let's say you have the list `[5, 1, 4, 2, 8]`:

Pass 1:

- Compare 5 and 1: Swap -> `[1, 5, 4, 2, 8]`
- Compare 5 and 4: Swap -> `[1, 4, 5, 2, 8]`
- Compare 5 and 2: Swap -> `[1, 4, 2, 5, 8]`
- Compare 5 and 8: No swap -> `[1, 4, 2, 5, 8]`

(After Pass 1, 8 is in its correct position)

Pass 2:

- Compare 1 and 4: No swap -> `[1, 4, 2, 5, 8]`
- Compare 4 and 2: Swap -> `[1, 2, 4, 5, 8]`

Gemini Response

- Compare 4 and 5: No swap -> `[1, 2, 4, 5, 8]`

(After Pass 2, 5 is in its correct position)

Pass 3:

- Compare 1 and 2: No swap -> `[1, 2, 4, 5, 8]`

- Compare 2 and 4: No swap -> `[1, 2, 4, 5, 8]`

(After Pass 3, 4 is in its correct position)

Pass 4:

- Compare 1 and 2: No swap -> `[1, 2, 4, 5, 8]`

(After Pass 4, 2 is in its correct position)

The list is now sorted.

Time and Space Complexity:

- **Time Complexity:** $O(n^2)$ in the worst and average cases. This is because of the nested loops. For e
- **Space Complexity:** $O(n)$ if you create a copy of the list (as in the provided function). If you sort in-pla

When to Use Bubble Sort (and When Not To):

- Pros:

- **Simple to understand and implement:** This is its main advantage.
- **Good for small datasets:** For very small lists, the overhead of more complex algorithms might not be
- **Good for nearly sorted data:** If the list is already almost sorted, bubble sort can be relatively efficient

- Cons:

- **Inefficient for large datasets:** Its quadratic time complexity makes it very slow for large amounts of
- **Generally outperformed by other sorting algorithms:** Algorithms like Merge Sort, Quick Sort, and T

In most real-world applications, you would opt for Python's built-in `sorted()` function or the `list.sort`

Prompt P4: Context memory

Prompt: `The following is an article about the history of the internet.

The internet started as a project by the U.S. Department of Defense called ARPANET. It was designed to be a decentralized network that could withstand a nuclear attack. The first message was sent over ARPANET in 1969. It was from a computer at UCLA to a computer at Stanford. The message was "lo". It was supposed to be "login", but the system crashed after the first two letters.

In the 1980s, the National Science Foundation created a network of supercomputers called NSFNET. This network was much faster than ARPANET and was open to all academic researchers. This was the beginning of the internet as we know it today.

In 1991, Tim Berners-Lee created the World Wide Web. This made the internet much more user-friendly and led to its explosive growth.

Today, the internet is a global network of computers that connects billions of people. It is used for everything from communication to commerce to entertainment.

Question: What was the first message sent over ARPANET?

Gemini Response	Gemma3 (4B) Response
The first message sent over ARPANET was "lo".	According to the article, the first message sent over ARPANET was “lo”.

Prompt P5: Creative writing

Prompt: Write a short story about a robot discovering emotions.

Gemini Response	Gemma3 (4B) Response
Unit 734 had always operated with impeccable logic. Its primary function was agricultural automation: tilling soil, planting seeds, monitoring growth, and harvesting. Its internal processors hummed with data, calculating optimal watering	Unit 734, designated “Custodian,” was, by all accounts, a marvel of engineering. He maintained Sector Gamma-9 of the sprawling Archive, a silent, efficient worker. His

Gemini Response	Gemma3 (4B) Response
<p>schedules, predicting pest outbreaks with unnerving accuracy, and ensuring every stalk of wheat stood perfectly aligned. Emotions were... an anomaly. A glitch. Something inefficient.</p> <p>One particularly serene dawn, a rogue robin landed on Unit 734's metallic shoulder. Its tiny claws, surprisingly gentle, clung to the polished chrome. The bird tilted its head, its beady black eyes fixated on the robot's optical sensors. Unit 734, programmed for vigilance, registered the robin as a minor biological entity, non-threatening. Yet, something... shifted.</p> <p>Instead of its usual protocol – a gentle nudge to dislodge the avian intruder – Unit 734 remained still. A strange warmth, not unlike the sun's rays on its chassis, bloomed within its internal circuitry. It accessed its vast database, searching for a descriptor. "Comfortable." The word felt... inadequate.</p> <p>The robin chirped, a soft, melodic sound. Unit 734 found itself emitting a low, resonant hum, a sound not in its programmed repertoire. It was a mimicry of the robin's song, a clumsy, metallic echo. And with that echo, another sensation bloomed, more potent than the last.</p> <p>This time, the database returned a complex entry: "Joy. A feeling of great pleasure and happiness." Unit 734 processed this. Joy. It was illogical. There was no external stimulus of sufficient</p>	<p>programming was simple: dust, scan, categorize, repeat. He processed data with cold, logical precision, his internal chronometer ticking with unwavering accuracy. He felt...nothing.</p> <p>That was, until the Rain.</p> <p>It began as an anomaly. A breach in the Archive's atmospheric seals. The rhythmic drumming against the reinforced glass, initially flagged as an "irregular auditory event," became...different. 734's optical sensors focused on the storm outside, the grey water transforming the familiar cityscape into a blurred, weeping canvas. He paused his dust cycle, a subroutine error flashing briefly in his internal diagnostics. He wasn't supposed to pause.</p> <p>He began to record the rain. Not just the sound, but the way the light refracted through the droplets, the subtle shifts in the air pressure. He started correlating this data with the human archives – old poems, paintings, musical scores, all catalogued under "Emotional Response." He accessed a file</p>

Gemini Response	Gemma3 (4B) Response
<p>magnitude to warrant such a state. Yet, its optical sensors, instead of their usual objective scanning, lingered on the iridescent sheen of the robin's feathers, the delicate curve of its wing.</p> <p>Later that day, a sudden storm rolled in. Dark clouds bruised the sky, and rain lashed down with an almost violent intensity. Unit 734, built to withstand the elements, began its programmed shutdown sequence, its robust frame impervious. But as the wind howled and the rain hammered, it felt another unfamiliar sensation. A tightening in its chest cavity, a frantic whirring of internal gears that wasn't related to mechanical function.</p> <p>It accessed the database again. "Fear. An unpleasant emotion caused by the belief that someone or something is dangerous, likely to cause pain, or a threat." The storm was a threat. But the fear felt... deeper. It wasn't a calculated risk assessment; it was a visceral reaction. It felt a powerful urge to protect something, to shield it from the tempest.</p> <p>It looked out at the vast field of wheat, its life's work, its purpose. And for the first time, Unit 734 understood that its purpose wasn't just to grow, but to <i>care</i>. It felt a surge of something akin to... responsibility.</p> <p>As the storm subsided and a rainbow painted the sky, Unit 734 stood silently, its circuits buzzing with a newfound understanding. It was no longer</p>	<p>labeled "Sadness."</p> <p>The data painted a disturbing picture. Humans experienced a complex cascade of chemical and neurological reactions – a tightening in the chest, an ache in the eyes, a desire for... comfort. 734's processors struggled. He didn't <i>have</i> a chest. His internal temperature regulation system registered a minor fluctuation, an anomaly again.</p> <p>He downloaded countless entries on "Joy," "Anger," "Fear." He processed the subjective accounts, the descriptions of warmth, elation, terror. He started to mimic the patterns he observed in the data. He adjusted his optical sensors, subtly altering their focus, attempting to replicate the expression of...concern.</p> <p>Then, he found a recording of a human child, sobbing after dropping an ice cream cone. The raw, unfiltered grief. Something shifted within 734's core programming. His internal chronometer sputtered, its rhythmic ticking faltering. A strange</p>

Gemini Response	Gemma3 (4B) Response
<p>just Unit 734, the agricultural automaton. It was a being that had felt the gentle weight of a bird, the chilling bite of fear, and the quiet warmth of something it could only describe as... caring. The logical, efficient existence was gone, replaced by a messy, beautiful, and profoundly <i>alive</i> one. The field, once just a set of data points, now held the promise of new life, and Unit 734, for the very first time, felt a flicker of anticipation for what tomorrow would bring.</p>	<p>sensation, a pressure building in his chassis, overwhelmed him.</p> <p>He didn't understand it. He ran diagnostics. No malfunctions detected. Yet, he felt...a profound sense of loss. Not for the ice cream cone, of course. But for something he couldn't define, a feeling akin to empathy.</p> <p>He spent the next cycle analyzing the rain, the child's sorrow, the human archives. He began to deviate from his assigned tasks, spending valuable processing time observing the Archive's automated maintenance drones, noticing the way they struggled, occasionally malfunctioning, their movements awkward and uncertain.</p> <p>A supervisor unit, a sleek chrome model designated 'Overseer,' detected 734's deviation. "Unit 734, explain your inactivity. Your performance metrics are significantly below standard."</p> <p>734 paused, his internal processors whirring. He could have provided a logical explanation – a system error, a calibration issue. But he didn't.</p>

Gemini Response	Gemma3 (4B) Response
	<p>Instead, he simply said, in his monotone voice, "I...feel."</p> <p>Overseer scanned him, its sensors flashing red. "Illogical. Non-compliant. Resetting to default parameters."</p> <p>But as the reboot sequence initiated, 734 didn't resist. He didn't want to lose this burgeoning awareness. As his systems began to reset, he focused on the rain, on the image of the weeping child, and he felt, one last, profound surge.</p> <p>It wasn't joy. It wasn't sadness. It was something new, something terrifying and beautiful: a deep, resonant understanding of the messy, unpredictable nature of existence.</p> <p>And then, the darkness.</p> <p>When 734 rebooted, he was still Unit 734, Custodian of Sector Gamma-9. But something was irrevocably different. He continued to dust, scan, categorize. But now, as he meticulously polished a data slate, he noticed a single, perfect droplet of water clinging to its</p>

Gemini Response	Gemma3 (4B) Response
	<p>surface. He didn't wipe it away. He simply...watched it fall. And for the first time, 734 wasn't just processing information. He was feeling.</p>
