

Prompt: Explain a Physics Informed Neural Network to an audience that is not familiar with machine learning. Use bullet points and make it an explanation less than 100 words and avoid jargon. This should be a written paragraph.

Copilot:

Explain a Physics Informed Neural Network to someone not familiar with machine learning. Use bullet points for an explanation less than 100 words and avoid being a written paragraph.

- **Neural Network:** Think of it as a smart computer program that learns like how we learn from practice.
- **Physics-Informed:** It knows physics rules, so it doesn't just learn; it also follows these rules.
- **Benefit:** This helps it solve problems in areas like engineering where physics is important, more accurately and efficiently.

Imagine teaching a computer both from experience and from a textbook at the same time—it gets the best of both worlds!



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Sure! Here's a more specific explanation:

- **Neural Network:** A computer program that learns from data, similar to how people learn by practicing.
- **Physics-Informed:** It's designed to follow the laws of physics, derived from data.
- **Benefit:** This helps it accurately solve problems in fluid dynamics (like how liquids and gases flow) by combining what it learns from data with physics.

So, it's like teaching a computer both from hands-on experience and theory at the same time for better accuracy and reliability!



While this is technically an accurate description of a physics informed neural network, it does not do a great job at integrating the physics with the actual implementation of a neural network. However, I like the summary sentence at the end, as I find it very informative. I would use CoPilot if I wanted a simple explanation, and was not concerned with the quality of the output.

ChatGPT:

Explain a Physics Informed Neural Network to an audience that is not familiar with machine learning. Use bullet points and make it an explanation less than 100 words and avoid jargon. This should be a written paragraph.

A Physics-Informed Neural Network (PINN) is a type of artificial intelligence that helps solve complex science problems by combining real-world physics with data. Instead of just learning from examples, like a regular neural network, a PINN also follows the rules of physics, ensuring its predictions make sense. This approach is useful when there is limited data because the built-in physics guides the model to be more accurate. PINNs can be used in areas like weather forecasting, medical research, and engineering to better understand natural processes while reducing the need for large amounts of experimental data.



Make this into bullet points

- A Physics-Informed Neural Network (PINN) is a type of artificial intelligence that combines real-world physics with data.
- Unlike regular neural networks, PINNs follow the rules of physics, ensuring predictions make sense.
- This approach is helpful when data is limited because built-in physics guides the model to be more accurate.
- PINNs are used in areas like weather forecasting, medical research, and engineering.
- They help scientists and engineers understand natural processes while reducing the need for large amounts of experimental data.



ChatGPT does an excellent job at answering the question and connecting the concept of physics with the neural network itself. Furthermore, it explains the application of Physics Informed Neural Networks, which makes it easier for the audience to grasp the concept. It did not include bullet points in its response, but it conveyed its output into a bullet point format when asked. It is also important to note that ChatGPT generated the quickest response.

Perplexity:

Explain a Physics Informed Neural Network to an audience that is not familiar with it. Use bullet points and make it an explanation less than 100 words and avoid jargon. Write in a single paragraph.

## Perplexity

A Physics Informed Neural Network (PINN) is a clever way to combine traditional physics knowledge with modern machine learning. Here's a simple explanation:

- It's a type of artificial intelligence that learns from data, like other neural networks.
- However, PINNs also incorporate known physical laws and equations into their learning process.
- This means they can make predictions that respect the rules of physics, even with limited data.
- PINNs are particularly useful for solving complex physics problems where traditional methods struggle.
- They can help in various fields, from fluid dynamics to materials science, providing accurate and physics-consistent results.


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# give me more examples of where physics-informed neural networks are used


Physics-informed neural networks - Wikipedia

 en.wikipedia

Exploring the Potential of Physics-Informed Neural...

 softserveinc

Solving real-world optimization tasks using...

 nature

## Perplexity

Physics Informed Neural Networks (PINNs) have found applications in various fields due to their ability to combine physical laws with machine learning. Here are more examples of where PINNs are used:

### Engineering and Design

- Topology optimization and characterization in structural engineering
- Electrical grid system modeling for energy distribution and demand
- Robotic arm control in manufacturing for precise movements in dynamic environments
- Drone systems for real-time stability adjustments and navigation

## **Fluid Dynamics and Material Science**

- Multiphase flow modeling in porous media 1
- High-speed fluid flow simulations 1
- Nano-optics applications 1
- Predicting material properties and optimizing material composition

## **Environmental and Earth Sciences**

- Climate change modeling and environmental sustainability studies
- Natural disaster mitigation and prediction 5

## **Healthcare and Medicine**

- Personalized medicine development 5
- Disease diagnosis optimization 5

Perplexity outperformed copilot, however, I still prefer the explanation that ChatGPT provided. It took much longer than ChatGPT to generate the response, but it correctly responded using bullet points when ChatGPT did not. I would use Perplexity if time was not a constraint, and I needed an answer that strictly obeyed the prompt provided.