Mission Brief:

Imagine you're working alongside a team of clinicians at a major hospital. You've just been handed hundreds of chest X-rays from patients showing possible signs of respiratory distress. There's one problem—time is critical, and radiologists are overwhelmed. The question is: **can you build a tool that helps flag pneumonia cases quickly and accurately, supporting medical staff when every minute matters?**

Pneumonia is one of the leading causes of death from infectious diseases worldwide. While chest X-rays are a common diagnostic tool, misdiagnoses still occur—especially in high-risk populations like children and the elderly. As a data scientist, you now have a chance to step in and make a meaningful impact.

Thanks to advancements in artificial intelligence, deep learning models—particularly convolutional neural networks (CNNs)—are being used to assist in diagnosing diseases from medical images. Your team has access to a powerful dataset: the **RSNA Pneumonia Detection Challenge** dataset, a rich collection of annotated X-ray scans curated specifically for this purpose.

Your Mission:

Develop a high-performing deep learning model that can detect pneumonia in chest X-rays. Using transfer learning with pre-trained CNNs like ResNet50, your challenge is to train and fine-tune a model that reaches **at least 75% classification accuracy**. Along the way, you'll explore which deep learning techniques and image features are most effective in identifying pneumonia cases.

This is more than just a coding exercise—it's a real-world case study in using AI to assist medical professionals, speed up diagnoses, and potentially save lives.

Research Question:

What deep learning techniques and image features are most effective for accurately detecting pneumonia in chest X-ray images?

Now it's your turn to step into the role. The hospital is counting on you—how will you respond?
