**Future Enhancements for the Breast Cancer Prediction Model**

1. **Include Additional Patient Information**

One potential improvement involves incorporating a wider range of patient data—such as genetic history, family medical background, and lifestyle factors like diet, exercise, or smoking habits. These features could provide the model with more context and lead to more accurate predictions. The current version primarily uses clinical and proteomic markers but expanding the dataset to include more personal health indicators would help create a more robust and well-rounded prediction tool.

1. **Enable Real-Time Prediction Capability**

Another meaningful enhancement would be transforming the model pipeline to support real-time predictions. While batch processing is sufficient for offline testing and analysis, real-time functionality would be much more practical in a clinical setting. Deploying the model through a cloud-based API—using tools like AWS SageMaker or FastAPI—would allow healthcare professionals to receive predictions instantly during patient consultations, improving workflow efficiency and clinical decision-making.

1. **Integrate Explainable AI (XAI) Tools**

To improve transparency and usability, it would be beneficial to integrate explainability methods such as SHAP (SHapley Additive Explanations) or LIME. These tools can highlight which input features contributed most to prediction, helping medical professionals better understand the model’s decisions. In high-stakes fields like healthcare, providing clear, interpretable output not only supports better decision-making but also builds trust in technology.