Q01：Goal and Loss Function of Linear Regression

- model_name：GPT
- model_version：4o
- prompt：What is the goal of linear regression? How is the loss function defined?
- response：

  The goal of linear regression is to find the best-fitting line (i.e., model parameters) that predicts the target variable. The loss function is typically defined as the Mean Squared Error (MSE), which measures the difference between the predicted values and the actual values. The formula for MSE is:

  MSE = (1 / n) * Σ (y_i - ŷ*i)^2*

  where yi is the actual value, ŷi is the predicted value, and n is the number of samples. The model parameters are optimized by minimizing the MSE.

- evaluation：大模型回答的结果正确

Q02：Basic Concept of Support Vector Machine

- model_name：GPT
- model_version：4o
- prompt：What is the basic idea of Support Vector Machine (SVM)?
- response：

  The basic idea of Support Vector Machine (SVM) is to find the optimal hyperplane that separates the data points into two classes while maximizing the margin between the two classes. SVM can be applied to both linearly separable problems and non-linearly separable problems using the kernel trick. The goal of SVM is to maximize the margin between the support vectors (the closest points to the hyperplane) and the decision boundary, thereby improving the model's generalization ability.

- evaluation：大模型回答的结果正确

Q03：Regularization in Linear Regression

- model_name：GPT
- model_version：4o
- prompt：How can regularization improve a linear regression model?
- response：

  In standard linear regression, if the model is too complex or if there is high multicollinearity among features, it can lead to overfitting. Regularization can help improve the model by adding a penalty term to the loss function to reduce model complexity. The most common regularization technique is **Ridge Regression**, which adds an L2 regularization term to the loss function: Loss Function = MSE + λ * Σ θ_j^2 where λ is the regularization parameter that controls the weight of the regularization term. Regularization helps to limit the magnitude of model parameters, making the model more stable and reducing overfitting.

- evaluation：大模型回答的结果正确

Q04：SVM for Non-linear Classification

- model_name：GPT
- model_version：4o
- prompt： How does Support Vector Machine handle non-linear classification problems?
- response：

  Support Vector Machine handles non-linear classification problems by using a **kernel function**, which maps the data into a higher-dimensional space where the data becomes linearly separable. Common kernel functions include the **linear kernel**, **polynomial kernel**, and **Gaussian kernel (RBF)**. By using the kernel trick, SVM can construct a non-linear decision boundary in the original input space, which corresponds to a linear hyperplane in the transformed higher-dimensional space, thus solving non-linear classification problems.
- evaluation：大模型回答的结果正确

Q05：Combining SVM with Neural Networks

- model_name：GPT
- model_version：4o
- prompt： In deep learning, how can Support Vector Machines (SVM) be combined with neural networks?
- response：

  Although Support Vector Machines and neural networks are different machine learning techniques, they can be combined in some cutting-edge approaches. One common method is to integrate SVM as a **classification layer** within a neural network architecture, typically for complex classification tasks. In this approach, neural networks are used to extract features, and then SVM is employed for the final classification decision. This combination leverages the neural network's ability to learn complex feature representations and SVM's precision in defining decision boundaries. Another approach is to incorporate the SVM loss function into the training process of the neural network to constrain the network's output, which can improve classification performance.
- evaluation：大模型回答的结果正确