Okay, here is a comprehensive study guide based on the provided PDF slides, covering the key concepts in both English and Chinese, as requested.

I. Introduction to Machine Learning (机器学习)

- **Definition (定义):**
  - **Data-first view:** Machine Learning (ML) is a set of tools for extracting knowledge from data. (ML 是一套从数据中提取知识的工具。)
  - **Deployment-first view:** ML is a set of tools together with a methodology for solving problems using data. (ML 是一套工具，以及一套使用数据解决问题的方法。)
- **Data (数据):** The materialization of an observation or a measurement. (观察或测量的物化。)
- **Dataset (数据集):** Data formatted as collections of items described by a set of pre-defined attributes. (以项目集合形式格式化的数据，由一组预定义的属性描述。)
- **Knowledge (知识):** Can be represented as a proposition, narrative, or model. (可以表示为命题、叙述或模型。)
- **Model (模型):** Describe relationships between attributes. (描述属性之间的关系。)
- **Science (科学):** About evaluating our knowledge. (关于评估我们的知识。)
- **Machine Learning (ML):** A set of tools together with a methodology for solving scientific, engineering, and business problems using data. (一套工具及方法论，用于解决科学、工程和商业问题。)
- **Two stages of ML (ML 的两个阶段):**
  - **Learning stage:** The model is built. (建立模型。)
  - **Deployment stage:** The model is used. (使用模型。)
- **Two basic tasks of ML (ML 的两个基本任务):**
  - **Training:** A model is created using data and a quality metric. (使用数据和质量指标创建模型。)
  - **Testing:** The performance of the model during deployment is assessed using new, unseen data. (使用新的、未见过的数据评估模型在部署期间的性能。)
- **Two main types of problems in ML (ML 中两个主要问题类型):**
  - **Supervised Learning (监督学习):** Estimate a missing label value by learning from a collection of known items. (通过学习已知项目集合来估计缺失的标签值。)
    - **Classification (分类):** The label is a discrete variable. (标签是离散变量。)
    - **Regression (回归):** The label is a continuous variable. (标签是连续变量。)
  - **Unsupervised Learning (无监督学习):** Find the underlying structure of our dataset. (找出数据集的潜在结构。)
    - **Structure Analysis (结构分析):** Focuses on groups of data points or identifies directions of interest. (关注数据点组或识别感兴趣的方向。)
    - **Density Estimation (密度估计):** Provide statistical models that describe the distribution of samples in the attribute space. (提供描述属性空间中样本分布的统计模型。)

II. Regression (回归)

- **Regression (回归):** A supervised problem where the goal is to predict the value of one attribute (label) using the remaining attributes (predictors). The label is a continuous variable. (一个监督问题，目标是使用其余属性（预测变量）来预测一个属性（标签）的值。标签是一个连续变量。)
- **Association (关联):** The ability to build predictors is due to association between attributes, rather than causation. (构建预测变量的能力源于属性之间的关联，而不是因果关系。)
- **Causation (因果):** In machine learning, we don't build causal models. (在机器学习中，我们不建立因果模型。)
- **Good model (好模型):** Needs a notion of model quality based on the prediction error, such as Sum of Squared Errors (SSE) and Mean Squared Error (MSE). (需要一个基于预测误差的模型质量概念，例如平方误差和 (SSE) 和均方误差 (MSE)。)
- **Error (误差):** The discrepancy between the true label and model prediction. (真实标签和模型预测之间的差异。)
- **Optimization problem (优化问题):** Finding the model with the lowest error on the dataset. (找到数据集上误差最小的模型。)
- **Simple regression (简单回归):** Considers one predictor and one label. (考虑一个预测变量和一个标签。)
- **Multiple regression (多元回归):** Considers two or more predictors. (考虑两个或多个预测变量。)
- **Least squares solution (最小二乘解):** An exact or analytical solution for linear models. (线性模型的一种精确或解析解。)
- **Flexibility (灵活性):** The ability of a model to generate different shapes. (模型生成不同形状的能力。)
- **Interpretability (可解释性):** The ability to understand in a qualitative manner how a predictor is mapped to a label. (以定性方式理解预测变量如何映射到标签的能力。)
- **Generalization (泛化):** The ability of a model to successfully translate what was learned during the learning stage to deployment. (模型将学习阶段学到的知识成功转化到部署阶段的能力。)
- **Underfitting (欠拟合):** Large training and deployment errors are produced because the model is unable to capture the underlying pattern. (由于模型无法捕捉到潜在的模式，导致产生较大的训练和部署误差。)

- **Overfitting（过拟合）:** Small errors are produced during training, but large errors during deployment because the model is memorizing irrelevant details. (在训练过程中产生较小的误差，但在部署过程中产生较大的误差，因为模型记住了不相关的细节。)

III. Methodology I (方法论 I)

- **Target population (目标总体):** The entire group that a model is intended to be used for. (模型 intended to be used 的整个群体。)
- **Sampling (抽样):** Extracting samples from the population to form a dataset. (从总体中提取样本以形成数据集。)
- **Representative dataset (代表性数据集):** Provides a complete picture of the target population. (提供目标总体的完整 ﬕ。)
- **Independent and identically distributed (iid) samples (独立同分布样本):** Samples that are independent of each other and are drawn from the same distribution. (彼此独立且来自相同分布的样本。)
- **Deployment performance (部署性能):** The performance of a model during deployment. (模型在部署期间的性能。)
- **Test dataset (测试数据集):** A subset of data used to estimate the deployment performance. (用于估计部署性能的数据子集。)
- **Test performance (测试性能):** An estimation of the true deployment performance. (对真实部署性能的估计。)
- **Error surface (误差曲面):** A function that maps each candidate model to its error. (将每个候选模型映射到其误差的函数。)
- **Optimal model (最优模型):** The model that achieves the highest quality on the target population. (在目标总体上实现最高质量的模型。)
- **Gradient descent (梯度下降):** A numerical optimization method that iteratively updates the model using the gradient of the error surface. (一种数值优化方法，使用误差曲面的梯度迭代更新模型。)
- **Learning rate (学习率):** Controls how much the model parameters are changed in each iteration of gradient descent. (控制梯度下降每次迭代中模型参数的变化幅度。)
- **Empirical error surface (经验误差曲面):** An approximation of the true error surface based on the training dataset. (基于训练数据集对真实误差曲面的近似。)
- **Training dataset (训练数据集):** A subset of data used to reconstruct the error surface needed during optimization. (用于重建优化过程中所需的误差曲面的数据子集。)
- **Regularization (正则化):** Modifies the empirical error surface by adding a term that constrains the values that the model parameters can take on. (通过添加一个约束模型参数取值的项来修改经验误差曲面。)
- **Validation (验证):** Necessary to compare different modeling options and select the best one. (用于比较不同的建模选项并选择最佳选项。)
- **Validation set approach (验证集方法):** Randomly splits the available dataset into a training and a validation dataset. (将可用数据集随机分成训练数据集和验证数据集。)
- **Leave-one-out cross-validation (LOOCV) (留一交叉验证):** The validation set contains only one sample. (验证集只包含一个样本。)
- **k-fold cross-validation (k 折交叉验证):** The available dataset is divided into k groups. (可用数据集被分成 k 组。)

IV. Classification I (分类 I)

- **Classification (分类):** A supervised learning problem where the label is discrete. (一种监督学习问题，其中标签是离散的。)
- **Decision/Detection problems (决策/检测问题):** Another name for classification problems. (分类问题的另一个名称。)
- **Class (类别):** Each of the values of a discrete label. (离散标签的每个值。)
- **Predictor space (预测变量空间):** A space where each axis represents a predictor. (每个轴代表一个预测变量的空间。)
- **Decision region (决策区域):** A region in the predictor space where all points are associated with the same label. (预测变量空间中的一个区域，其中所有点都与相同的标签相关联。)
- **Decision boundary (决策边界):** The boundary between decision regions. (决策区域之间的边界。)
- **Linear classifier (线性分类器):** Uses linear boundaries between decision regions. (在决策区域之间使用线性边界。)
- **Linear equation (线性方程):** Defines the linear boundaries. (定义线性边界。)
- **Accuracy (准确率):** The proportion of correctly classified samples. (正确分类样本的比例。)
- **Error rate (错误率):** The proportion of misclassified samples. (错误分类样本的比例。)
- **Best linear classifier (最佳线性分类器):** The linear classifier that achieves the highest accuracy on a dataset. (在数据集上实现最高准确率的线性分类器。)
- **Linearly separable dataset (线性可分数据集):** A dataset where a linear classifier can achieve an accuracy of 1. (线性分类器可以实现 1 的准确率的数据集。)
- **Non linearly-separable dataset (非线性可分数据集):** A dataset where the accuracy of a linear classifier is less than 1. (线性分类器的准确率小于 1 的数据集。)
- **Logistic Function (逻辑函数)**: Defined as $p(d) = e^d/(1+e^d)$. (定义为$p(d) = e^d/(1+e^d)$)
- **Logistic Model (逻辑模型):** Applies the logistic function to the distance of a sample from a linear boundary in a classification problem. (将逻辑函数应用于样本到分类问题中线性边界的距离。)
- **Logistic Regression Classifier (逻辑回归分类器):** The linear classifier that maximizes the likelihood or log-likelihood function. (最大化似然或对数似然函数的线性分类器。)

V. Classification II (分类 II)

- **Class-sensitive problems (类别敏感问题):** Problems where the cost of misclassifying samples from different classes is different. (错误分类来自不同类别的样本的成本不同的问题。)
- **Misclassification cost (错误分类成本):** The cost associated with misclassifying a sample. (与错误分类样本相关的成本。)
- **Confusion matrix/Contingency matrix (混淆矩阵/列联表):** Shows the number of samples for each class that are correctly and incorrectly classified. (显示每个类别正确和错误分类的样本数量。)
- **True Positive (TP) (真正例):** A positive sample that is correctly classified as positive. (被正确分类为正例的正样本。)
- **False Negative (FN) (假反例):** A positive sample that is incorrectly classified as negative. (被错误分类为负例的正样本。)
- **False Positive (FP) (假正例):** A negative sample that is incorrectly classified as positive. (被错误分类为正例的负样本。)
- **True Negative (TN) (真反例):** A negative sample that is correctly classified as negative. (被正确分类为负例的负样本。)
- **True Positive Rate (TPR)/Sensitivity/Recall (真正率/灵敏度/召回率):** TP/(TP+FN). (真正例/(真正例+假反例))
- **False Negative Rate (FNR) (假负率):** FN/(TP+FN). (假反例/(真正例+假反例))
- **False Positive Rate (FPR) (假正率):** FP/(FP+TN). (假正例/(假正例+真反例))
- **True Negative Rate (TNR)/Specificity (真负率/特异度):** TN/(TN+FP). (真反例/(真反例+假正例))
- **Precision (精度):** TP/(TP+FP). (真正例/(真正例+假正例))
- **Bayes classifier (贝叶斯分类器):** Achieves the highest accuracy by comparing the posterior probabilities. (通过比较后验概率实现最高准确率。)
- **Posterior probability (后验概率):** The probability that a sample belongs to a class given the value of its predictors. (在给定预测变量值的情况下，样本属于某个类别的概率。)
- **Prior probability (先验概率):** The probability of a class before observing any data. (在观察任何数据之前类别的概率。)
- **Class density (类别密度):** The probability density function of a class. (类别的概率密度函数。)
- **Odds ratio (几率):** The ratio of two posterior probabilities. (两个后验概率的比率。)
- **Threshold value (阈值):** A value used to compare the odds ratio and assign a sample to a class. (用于比较几率并将样本分配给某个类别的值。)
- **ROC plane (ROC 平面):** A plane used to represent the performance of a classifier in terms of its sensitivity and 1-specificity. (用于表示分类器性能的平面，以灵敏度和 1-特异度表示。)
- **ROC curve (ROC 曲线):** A curve in the ROC plane that represents all the classifiers resulting from calibrating the threshold. (ROC 平面中的一条曲线，代表通过校准阈值得到的所有分类器。)
- **Area Under the Curve (AUC) (曲线下面积):** A measure of goodness for a classifier that can be calibrated. (衡量可校准分类器优劣的指标。)
- **F1-score**: Harmonic mean of precision and recall. (精度和召回率的调和平均数)

VI. Structure Analysis (结构分析)

- **Unsupervised learning (无监督学习):** Aims to find the underlying structure of a dataset. (旨在找到数据集的潜在结构。)
- **Density estimation (密度估计):** Creates models that allow us to quantify the probability of finding a sample within a region of the attribute space. (创建模型以量化在属性空间的某个区域内找到样本的概率。)
- **Structure analysis (结构分析):** Creates models that identify regions within the attribute space (cluster analysis) or directions (component analysis) with a high density of samples. (创建模型以识别属性空间内具有高样本密度的区域（聚类分析）或方向（成分分析）。)
- **Prototypes (原型):** Samples used to provide summaries of a population. (用于提供总体摘要的样本。)
- **Cluster analysis (聚类分析):** A family of unsupervised learning algorithms that describe the structure of a dataset as groups, or clusters, of similar samples. (一类无监督学习算法，将数据集的结构描述为相似样本的组或簇。)
- **Similarity (相似性):** A notion needed in order for us to partition a dataset into clusters. (为了将数据集划分为簇，我们需要一个相似性的概念。)
- **Proximity (邻近性):** A notion of similarity based on the distance between samples. (基于样本之间距离的相似性概念。)
- **Intra-cluster sample scatter (簇内样本散布):** The sum of the square distances between samples in the same cluster. (同一簇中样本之间的平方距离之和。)
- **Inter-cluster sample scatter (簇间样本散布):** The sum of the distances between samples in different clusters. (不同簇中样本之间的距离之和。)
- **K-means clustering (K 均值聚类):** A clustering algorithm that partitions a dataset into K clusters represented by their mean. (一种将数据集划分为 K 个簇的聚类算法，每个簇由其均值表示。)
- **Cluster prototype (簇原型):** A representative point of a cluster, such as its center. (簇的代表点，例如其中心。)
- **Density-based clustering (基于密度的聚类):** A family of clustering algorithms that group samples based on their density. (一类基于样本密度对样本进行分组的聚类算法。)
- **DBSCAN (Density-Based Spatial Clustering of Applications with Noise):** A density-based clustering algorithm that identifies core, border and outlier samples. (一种基于密度的聚类算法，可识别核心样本、边界样本和异常值样本。)
- **Core sample (核心样本):** A sample whose density is equal or higher than a threshold. (密度等于或高于阈值的样本。)

- **Border sample (边界样本):** A sample whose density is lower than a threshold, but contains a core sample within its neighbourhood. (密度低于阈值，但在其邻域内包含核心样本的样本。)
- **Outlier sample (异常值样本):** Any sample that is not a core or border sample. (任何不是核心样本或边界样本的样本。)
- **Hierarchical clustering (层次聚类):** A family of clustering approaches that proceed by progressively building clustering arrangements at different levels. (一类聚类方法，通过在不同级别逐步构建聚类排列来进行。)
- **Dendrogram (树状图):** A representation of the relationship between clusters at different levels. (表示不同级别集群之间关系的图表。)
- **Divisive (top-down) approach (分裂式（自顶向下）方法):** Splits clusters starting from the top of the dendrogram. (从树状图的顶部开始分割簇。)
- **Agglomerative (bottom-up) approach (凝聚式（自底向上）方法):** Merges two clusters, starting from the bottom of the dendrogram. (从树状图的底部开始合并两个簇。)
- **Single linkage (单链接):** Uses the distance between the two closest samples from two clusters. (使用来自两个簇的两个最接近样本之间的距离。)
- **Complete linkage (全链接):** Uses the distance between the two further samples from each pair of clusters. (使用来自每对簇的两个最远样本之间的距离。)
- **Group average (组平均):** Uses the average distance between samples in two clusters. (使用两个簇中样本之间的平均距离。)
- **Component analysis (成分分析):** Allows us to identify the directions in the space that our data are aligned with. (允许我们识别数据对齐的空间方向。)

VII. Density Estimation (密度估计)

- **Probability density (概率密度):** A model that describes the underlying true distribution of the data. (描述数据潜在真实分布的模型。)
- **Marginal probability density (边际概率密度):** A probability density that considers a subset of the attributes. (考虑属性子集的概率密度。)
- **Non-parametric methods (非参数方法):** Do not specify the shape of the probability density. (不指定概率密度的形状。)
- **Histogram (直方图):** The simplest and best known non-parametric method for density estimation. (最简单且最知名的密度估计非参数方法。)
- **Bins (箱):** Equal-sized regions into which the feature space is divided in a histogram. (在直方图中将特征空间划分成的等大小区域。)
- **Kernel methods (核方法):** Build an individual density around each sample and then combine all the densities together. (在每个样本周围建立一个单独的密度，然后将所有密度组合在一起。)
- **Parametric density estimation (参数密度估计):** Specifies the shape of the probability density and estimates its parameters. (指定概率密度的形状并估计其参数。)
- **Gaussian distribution (高斯分布):** A common choice for the shape of the probability density. (概率密度形状的常见选择。)
- **Mean (均值):** A parameter of the Gaussian distribution that describes its location. (高斯分布的一个参数，描述其位置。)
- **Variance (方差):** A parameter of the Gaussian distribution that describes its spread. (高斯分布的一个参数，描述其 spread。)
- **Mixture models (混合模型):** A combination of probability densities. (概率密度的组合。)
- **Gaussian Mixture Model (GMM) (高斯混合模型):** A combination of Gaussian densities. (高斯密度的组合。)
- **Expectation-maximization (EM) algorithm (期望最大化算法):** An iterative process to fit a GMM to a dataset. (将 GMM 拟合到数据集的迭代过程。)
- **Anomaly detection (异常检测):** Identifying samples that are unlikely to belong to the same population as the rest of the data. (识别不太可能与其余数据属于同一总体的样本。)
- **Outliers (异常值):** Samples that are likely to belong to a different population. (可能属于不同总体的样本。)
- **Robustness (稳健性):** A design requirement that mitigates the impact of outliers. (减轻异常值影响的设计要求。)

VIII. Neural Networks and Deep Learning (神经网络和深度学习)

- **Neural network (神经网络):** A computing system loosely inspired by the human nervous system. (一种受人脑神经系统松散启发的计算系统。)
- **Perceptron (感知器):** The basic unit of a neural network. (神经网络的基本单元。)
- **Weight vector (权重向量):** Defines the connection strengths in a perceptron. (定义感知器中的连接强度。)
- **Activation function (激活函数):** A non-linear function that maps the weighted sum of inputs to an output in a perceptron. (将输入的加权和映射到输出的非线性函数。)
- **Bias (偏置):** The coefficient w0 in a perceptron. (感知器中的系数 w0。)
- **Layer (层):** A collection of perceptrons that use the same input. (使用相同输入的感知器集合。)
- **Input layer (输入层):** The predictor vector. (预测变量向量。)
- **Hidden layers (隐藏层):** Layers between the input and output layers. (输入层和输出层之间的层。)
- **Output layer (输出层):** Produces the prediction. (产生预测。)
- **Architecture (架构):** Describes how layers are connected. (描述层如何连接。)
- **Fully-connected (FC) layer (全连接层):** All perceptrons receive all the outputs from the previous layer. (所有感知器都接收来自前一层的所有输出。)

- **Logistic model (逻辑模型):** A perceptron with a logistic activation function. (具有逻辑激活函数的感知器。)
- **Likelihood function (似然函数):** A quality metric used to train logistic models. (用于训练逻辑模型的质量指标。)
- **Log-likelihood (对数似然):** The logarithm of the likelihood function. (似然函数的对数。)
- **Gradient descent (梯度下降):** An optimization method used to train neural networks. (用于训练神经网络的优化方法。)
- **Back-propagation (反向传播):** An efficient algorithm to compute the gradient. (计算梯度的有效算法。)
- **Step size/Learning rate (步长/学习率):** Controls how much the parameters are updated in each iteration of gradient descent. (控制梯度下降每次迭代中参数的更新幅度。)
- **Convolutional layer (卷积层):** A layer where perceptrons are arranged as a grid (feature map) and share their parameters (kernel). (感知器排列成网格（特征图）并共享其参数（内核）的层。)
- **Feature map (特征图):** The output of a convolutional layer. (卷积层的输出。)
- **Kernel (内核):** The shared parameters of the perceptrons in a convolutional layer. (卷积层中感知器的共享参数。)
- **Convolution (卷积):** The operation of applying a kernel to an input. (将内核应用于输入的操作。)
- **Pooling layer (池化层):** Reduces the size of feature maps. (减小特征图的大小。)
- **Max pooling (最大池化):** The output is the largest value within the filter area. (输出是 filter 区域内的最大值。)
- **Average pooling (平均池化):** The output is the average of the values within the filter area. (输出是 filter 区域内值的平均值。)
- **Deep learning architectures (深度学习架构):** Predefined architectures that are suitable for specific goals. (适用于特定目标的预定义架构。)
- **Transfer learning (迁移学习):** Reusing a pre-trained neural network for a related problem. (将预训练的神经网络重新用于相关问题。)

IX. Deployment (部署)

- **Technological products (技术产品):** Products that will eventually be deployed to deliver value. (最终将被部署以交付价值的产品。)
- **Deployment (部署):** The stage where a model is used in a real-world setting. (在现实世界环境中使用模型的阶段。)
- **Machine learning system (机器学习系统):** Consists of the data, software, hardware and other infrastructure needed to deploy a machine learning model. (由部署机器学习模型所需的数据、软件、硬件和其他基础设施组成。)
- **Product lifecycle (产品生命周期):** A business strategic tool that identifies the activities necessary to successfully build and deploy a product. (一种业务战略工具，用于识别成功构建和部署产品所需的活动。)
- **Data flywheel (数据飞轮):** A strategy where models are continuously improved using new data produced during deployment. (一种策略，其中使用部署期间产生的新数据不断改进模型。)
- **Deployment environment (部署环境):** The target environment where machine learning models are used. (使用机器学习模型的目标环境。)
- **Data science environment (数据科学环境):** An environment specifically designed to process and analyse data. (专门设计用于处理和分析数据的环境。)
- **Reproducible deployment (可复现的部署):** A deployment where the built and deployed machine learning pipelines produce the same output when they are presented the same input. (一种部署，其中构建和部署的机器学习 pipeline 在输入相同时产生相同的输出。)
- **Executable file (可执行文件):** A file that can be run directly by a computer. (可以直接由计算机运行的文件。)
- **Packaging (打包):** The process of bundling together code and its dependencies. (将代码及其依赖项捆绑在一起的过程。)
- **Containers (容器):** A way of packaging code, runtime, and dependencies as images. (将代码、运行时和依赖项打包为镜像的方法。)
- **Cloud deployments (云部署):** Deploying machine learning models on servers that are accessible via the internet. (在可通过互联网访问的服务器上部署机器学习模型。)
- **API (Application Programming Interface):** A set of rules and specifications that software programs can follow to communicate with each other. (一组规则和规范，软件程序可以遵循这些规则和规范来相互通信。)
- **MLOps (Machine Learning Operations):** A set of practices that aims to deploy and maintain machine learning models in production reliably and efficiently. (一组实践，旨在可靠且高效地在生产环境中部署和维护机器学习模型。)

X. Additional Topics Covered

- **Normalisation (归一化):** Scaling attributes so that their values belong to similar ranges. (缩放属性，使其值属于相似的范围。)
  - **Min-max normalisation (最小值-最大值归一化):** Scales values to a range between 0 and 1. (将值缩放到 0 到 1 之间的范围。)
  - **Standardisation (标准化):** Scales values to have 0 mean and unit standard deviation. (将值缩放为均值为 0，标准差为 1。)
- **Transformations (转换):** Data manipulations that change the way that we represent our samples. (改变我们表示样本方式的数据操作。)
  - **Linear transformations (线性变换):** Can be seen as a rotation and scaling. (可以看作是旋转和缩放。)
  - **Non-linear transformations (非线性变换):** More complex transformations that cannot be described as a rotation and scaling. (更复杂的转换，不能描述为旋转和缩放。)
  - **Dimensionality reduction (降维):** Reducing the number of attributes. (减少属性的数量。)
    - **Feature selection (特征选择):** Selecting a subset of the original attributes. (选择原始属性的子集。)
    - **Feature extraction (特征提取):** Producing a new set of attributes by processing the original attributes. (通过处理原始属性来生成一组新的属性。)

    - **Principal components analysis (PCA) (主成分分析):** Identifies the directions along which samples are aligned. (识别样本对齐的方向。)
- **Ensembles (集成):** A machine learning strategy that combines the output from individual models. (一种结合来自各个模型输出的机器学习策略。)
    - **Bagging (Bagging):** Creates an ensemble by training multiple models on random subsets of the data. (通过在数据的随机子集上训练多个模型来创建集成。)
    - **Decision trees (决策树):** Classifiers that partition the predictor space into multiple decision regions by implementing sequences of splitting rules. (通过实现一系列分割规则将预测变量空间划分为多个决策区域的分类器。)
    - **Random forests (随机森林):** An ensemble of decision trees. (决策树的集成。)
    - **Boosting (提升):** Creates an ensemble by training a sequence of simple base models, where each successive model focuses on the samples that the previous models could not handle properly. (通过训练一系列简单的基础模型来创建集成，其中每个后续模型都侧重于前一个模型无法正确处理的样本。)

This comprehensive study guide covers all the key concepts and terminology presented in the PDF slides, providing a strong foundation for understanding the fundamentals of machine learning and deployment. Remember to refer back to the original slides for visual aids and specific examples. Good luck with your studies!