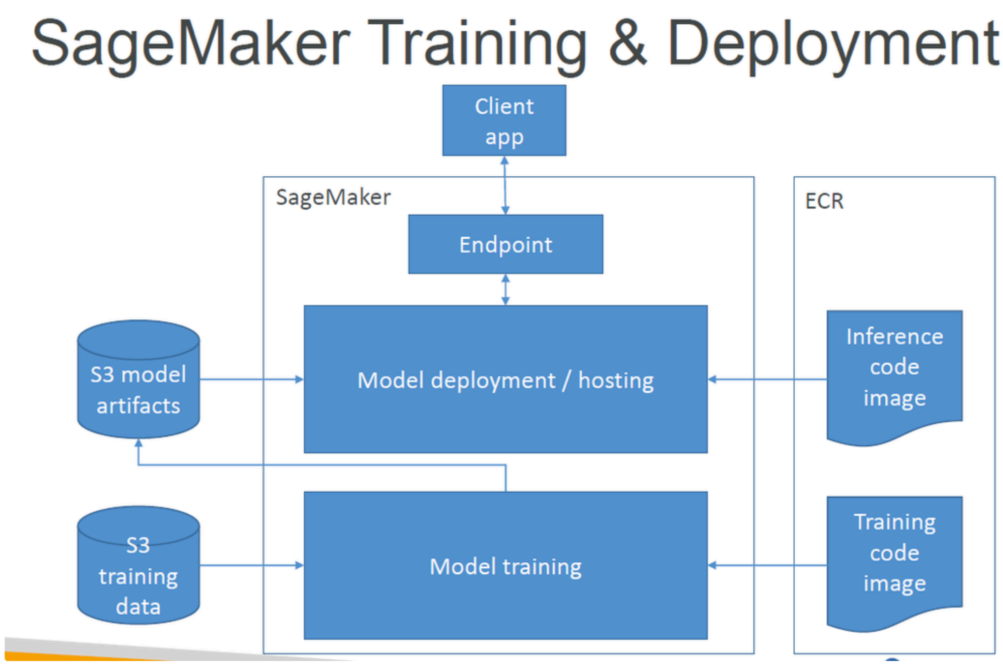
AWS ML - Modeling



Training on SageMaker

Create a training job
•URL of S3 bucket with training data
•ML compute resources
•URL of S3 bucket for output
•ECR path to training code

Deploying Trained Models

Save your trained model to S3
Can deploy two ways:

- Persistent endpoint for making individual predictions on demand
- SageMaker Batch Transform to get predictions for an entire dataset

Linear learner :

- regression & classification
- input : csv(first column is the label or RecordIO wrapped protobuf(32 float)
- file mode : takes the entire dataset / Pipe mode: takes batches of dataset (efficient for large training dataset)
- Training data must be **normalized** (so all features are weighted the same). Linear Learner can do this for you automatically
- Uses stochastic gradient descent

Logistic Regression : Binary classification

Decision tree : classification or regression

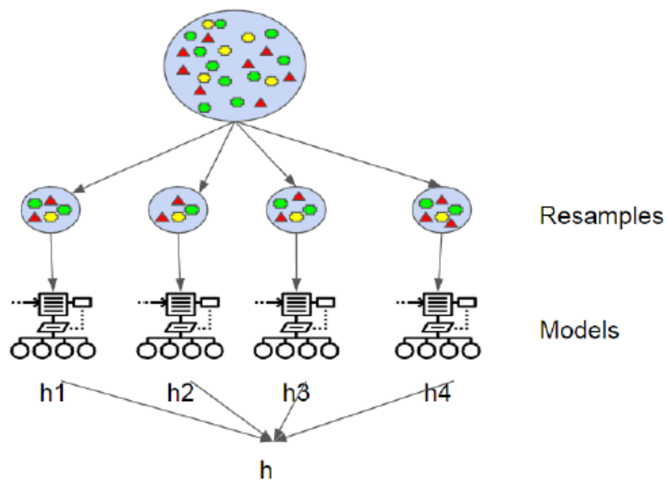
Naive Bayes: classification

multivariate Regression : predicting a dependent variable based on independant variables

Ensemble Methods

An ensemble methos takes multiple models and they might be a variation of the same model(different set of training data, …) and lets them all vote on a final result.

Bagging

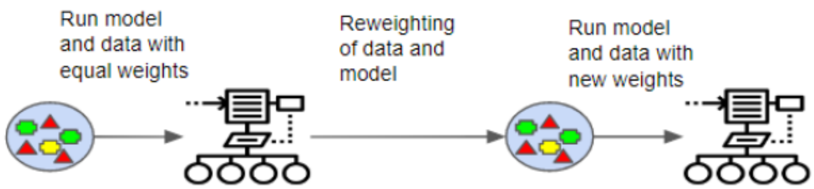


> Bagging would generate multiple training sets by **random samling with replacement.** Each resampled model can be trained in parallel.

Random Forest

Boosting

Training is sequential; each classifier takes into account the previous one’s success. Observations are weighted



Boosting generally yields better accuracy

Bagging avoids overfittings

XGBoost

- eXtreme Gradient Boosting
- Boosted group of decision trees
- New trees made to correct the errors of previous trees
- Uses gradient descent to minimize loss
- M5 is a good choice as instance type
- **Hyperparameters**
  - **Subsample**
    •Prevents overfitting
  - **Eta**
    •Step size shrinkage, prevents overfitting
  - **Gamma**
    •Minimum loss reduction to create a partition; larger = more conservative
  - **Alpha**
    •L1 regularization term; larger = more conservative
  - **Lambda**
    •L2 regularization term; larger = more conservative
  - **eval_metric**
    •Optimize on AUC, error, rmse…
    •For example, if you care about false positives more than accuracy, you might use AUC here
  - **scale_pos_weight**
    •Adjusts balance of positive and negative weights
    •Helpful for unbalanced classes
    •Might set to sum(negative cases) / sum(positive cases)
  - **max_depth**
    •Max depth of the tree
    •Too high and you may overfit

Semantic Segmentation

Pixel-level object classification
Different from image classification – that assigns labels to whole images
Different from object detection – that assigns labels to bounding boxes

What training input does it expect?
JPG Images and PNG annotations For both training and validation

JPG images accepted for inference

GPU instances for training (ml.p2, p3, g4dn, g5) Multi-GPU and multi-machine OK.
CPU or GPU for inference (m5, p2, p3, g4dn, g5)

Seq2Seq

- Translation, summarization..
- , speech to text
- implemented with RNN or CNN with attention
- **What training input does it expect?** : RecordIO-Protobuf (integers)
- must provide vocabulary files

BlazingText

- Text Classification : use with sentences not entire documents
- **What training input does it expect?** One sentence per line
- Word2vec
- **What training input does it expect?** a text file with one training sentence per line

Time Series

- **Additive Model:** Seasonality with constant seasonal variation + Tends+Noise
- **Multiplicative model:** seasonal variation increases as the trend increases