**Beverage Quality Evaluation Using Apache Spark and Flintrock**

**Preface**

This manual delineates the methodology for constructing an Apache Spark cluster via Flintrock and employing Spark for the assessment of beverage quality. It involves utilizing an established model for analysis and subsequent deployment using Docker services.

**Initial Configuration and Setup**

**Setting Up Flintrock**

Firstly, verify if Python 3 is installed. Subsequently, proceed with the Flintrock installation:

**pip3 install git+**[**https://github.com/nchammas/flintrock**](https://github.com/nchammas/flintrock)

**Configuration of AWS Environment**

Configure your EC2 instance with AWS using the command **aws configure**, integrating credentials from the AWS Lab.

**Preparing Flintrock**

Prior to cluster initialization, verify the availability of a legitimate .pem file for accessing EC2 instances. Follow these steps: Migrate your .pem file to the EC2 instance, Run **flintrock configure** to generate a .config/flintrock/config.yaml file. Then Adjust the .config/flintrock/config.yaml file to include the .pem file path, key-name, identity-file, ami, and adjust the slave count to 4.

**Cluster Initiation**

Initiate your cluster using Flintrock:

**flintrock launch wine-cluster**

**Data Transfer to Cluster**

Upload the Training data file (TrainingDataset.csv) to the cluster:

**flintrock copy-file wine-cluster TrainingDataset.csv /home/ec2-user/**

**Cluster Access**

Securely connect to the master node of the cluster:

**flintrock login wine-cluster**

**Library Installation**

Install the required libraries within the cluster:

**pip3 install numpy**

**sudo yum install git**

**Docker Installation on the Cluster**

Follow these steps to install Docker on the cluster:

**sudo yum install docker -y**

**sudo systemctl restart docker**

**sudo usermod -aG docker $USER**

**source ~/.bashrc**

**Cloning the Repository**

Proceed to clone the repository:

**git clone https://github.com/aravind563/Cs643\_programming\_assignment2\_aravind\_kurapati.git**

**cd Cs643\_programming\_assignment2\_aravind\_kurapati**

**Training Process**

This section is dedicated to executing the training operation on the cluster.

**Acquiring the Master Node IP**

From the AWS EC2 console, retrieve the Public IPv4 DNS of the master node.

**Training Execution on the Cluster**

Commence the training on the 4-worker cluster:

**spark-submit --master spark://<publicIP>:7077 <train.py>**

**Deployment of Prediction Model**

This section deals with setting up a Docker container for the evaluation of beverage quality using the trained model.

**Container Configuration and Deployment**

Formulate the Docker container for the beverage quality evaluation service:

**docker build -t wine-predictor .**

Deploy the Docker container on the master node:

**docker run -v /home/ec2-user/spark:/home/ec2-user/spark -p 5000:5000 wine-predictor:latest**

**HTML File Modification**

Update your local HTML file to direct evaluation requests to the Docker endpoint:

**http://<publicIP>:5000/predict**

**Establishing Inbound Security Rule**

Create an inbound security rule via the AWS EC2 dashboard for the master node to permit traffic on port 5000, thus facilitating external access to the Docker service.

**Displaying the F1 Score**

Following the submission of the validation CSV through the browser, the Docker service will exhibit the evaluation results and the F1 score on the interface.

Completing these steps signifies the successful configuration of a cluster, execution of beverage quality assessment using Spark, and deployment of outcomes via Docker services.

