

Practice 1 Integration of Heterogeneous Systems

Introduction

IoT systems often generate data that needs interpretation. To interpret that data, a known way to treat it is the use of machine learning. To do this, data is first collected and tagged with a known output. Subsequently, a classifier is trained with that training data. This classifier allows estimating the output for other input data from IoT sensors.

This practice proposes to do this in the context of heterogeneous systems integration. To do this, it is proposed to use the integration mechanism between Python (with Bottle) and Java that is being worked on in the theory class (pages 33-40 of slides on "Integration of Heterogeneous Systems").

Steps:

1. Install the following applications if they are not already installed:

JDK + Netbeans

Python

Framework Bottle for Python

2. Choose an IoT domain to practice on (see domain example below). You can choose the proposed domain or another.

3. Define a Java program that collects training data, in which the user performs certain actions, labeling them with an output. This program will allow you to go to prediction mode. The goal is for the user to do certain actions again, and the program to estimate the output with a classifier. To do this classification, it will call a Python program that, given some training data, and some estimation data, returns said output.

4. Develop a Python program and the Bottle framework that acts as a local server. Given some training parameters (input, output pairs), and an input, estimate the output for that input. You can use a neural network MLP (Multi-layer perceptron) or another classifier that is deemed appropriate. This service can be used with HTTP calls.

5. Connect the Java program to the Python server through HTTP requests as seen in class, so that the Java program estimates the output correctly. If the input data is large, POST parameters can be used, although it is recommended to start using GET parameters, to facilitate initial development.

6. Try to train the system with positive and negative cases, and then estimate new cases.

Example of Proposed Domain:

- Smart home that records the number of hours a day you spend in each room of the house.
- The output can be to say if an event such as the following has occurred:
- Stomach problems from spending a lot of time in the bathroom and little time in the kitchen

Files prepared by students

A compressed file (.zip) must be prepared containing the following:

- Report that explains the domain of the practice and the most relevant aspects. It should include a small user guide, with screenshots of the application working.
- A folder with the programming code of the application