An AI-Based Approach to Replace The Kinect With The Grid-Eye sensor

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Introduction

- The Microsoft Kinect sensor is currently being used in the smart home environments created by the lab.
- However, the Kinect is big and expensive. The goal is to find a replacement for the Kinect.
- This replacement is the Grid-Eye sensor. It is a thermal sensor that reads the temperatures of the environment in front of it.
- With the introduction of a simple machine learning algorithm, the Grid-Eye sensor can be used to replace the Kinect sensor.

Approach:

- **Gridding –** Breaking Kinect data into an eight by eight grid to match the data coming in from the grid eye sensor.
- **Multilayer Perceptron AI Algorithm** – Using the Multilayer Perceptron AI algorithm to predict the temperature and the number of people in front of the sensor.

Tools

- Raspberry Pi
- Panasonic Grid-eye sensor
- Microsoft Kinect V1
- Waikato Environment for Knowledge Analysis (WEKA)

Grid-Eye Sensor

- Built by Panasonic
- Creates an eight by eight grid of the environment in front of it
- 60 degree viewing angle
- Operating temperature range of -20°C − 80°C
- Slight delay in readings
- Occasional false temperature readings

Kinect Sensor

- Built by Microsoft
- Can track the skeleton of two people and the center of mass of up to 6 people
- 60 degree viewing angle
- Slight problem with recognizing skeletons after the person moves back into the viewing angle

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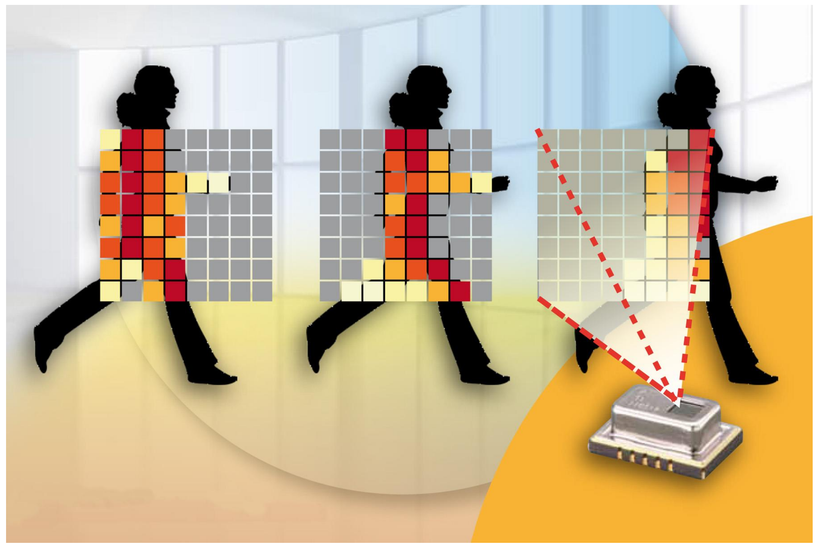

Figure 1: Image of the Grid-Eye sensor and it's vision

Figure 2: Image of the Kinect V1 and its various sensors

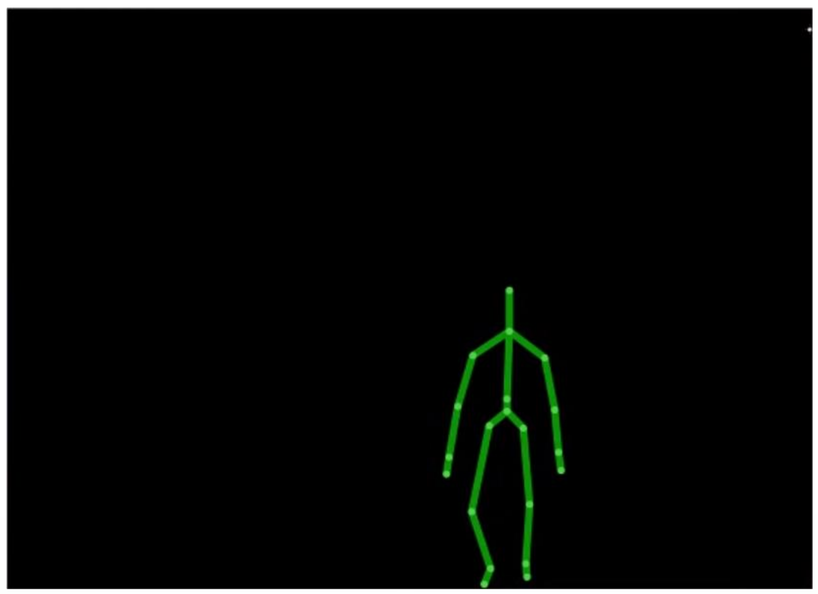

Figure 3: Image of the skeleton tracking technology of the Kinect sensor

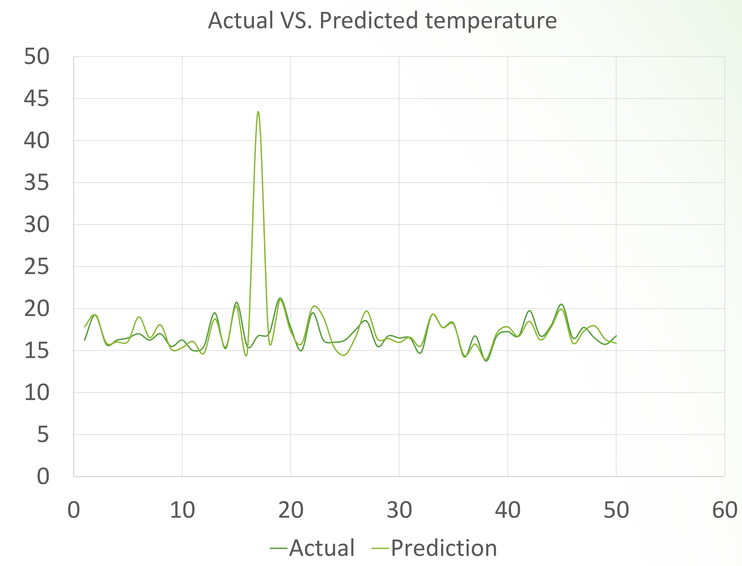

Figure 4: This graph compares Actual number of people in front of the sensor to the predicted number of people in front of the sensor

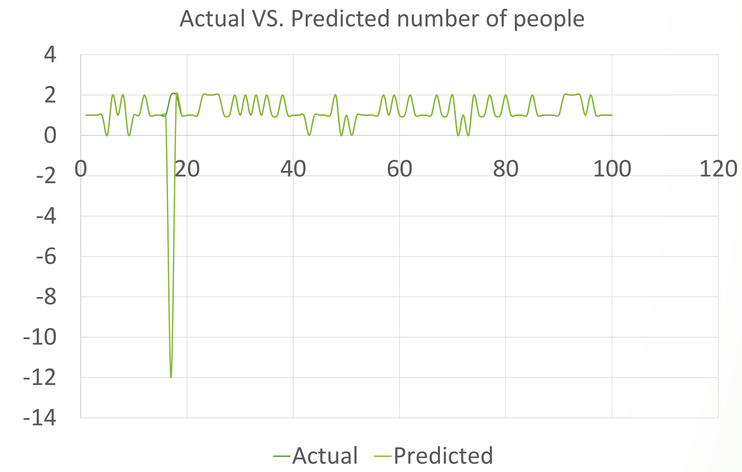

Figure 5: This graph compares the actual temperature values to the predicted values for temperature.

Conclusions & Future Work

- The AI had a 99% success rate at determining the number of people standing in front of the sensor. Only six out of 639 predictions were false.
- The AI had a 98% success rate at determining the temperature value of a cell in the eight by eight grid. All but 14 of the predicted temperature values were within two degrees of the actual value.
- Future work must study the possibility of detecting when a person is in motion in front of the sensor.

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