EXTRACTION OF VALUES REPRESENTING HUMAN FEATURES IN ORDER TO DEVELOP A PRIVACY-PRESERVING SENSOR

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Abstract. *There has been a recent increase in the number of cases of the death of elderly persons caused by falls in toilets and bathrooms in their homes. It is not possible to install security cameras for such cases from the perspective of privacy. In order to address this problem, we are conducting a study to materialize a privacy-preserving sensor. To be more precise, the integration value of the horizontal and vertical directions of the two dimensional image data is incorporated equivalently as a one dimensional luminance distribution by combining the one dimensional line sensor and the cylindrical lens. Although this will not enable personal verification, it will make it possible to create a sensor that can detect a person's presence, position, and movement.*

We used the Learning Vector Quantization (LVQ) for the algorithm of the sensor. However, determining the optimum parameter for the LVQ is time consuming. In order to resolve this problem, we used the S-System. By employing this system, we were able to obtain the optimum parameter without the need for knowledge on the LVQ.
Keywords: Privacy preserving, Line sensor, Learning vector quantization, Genetic algorithm

1. **Introduction.** There are frequent cases of the death of elderly persons caused by falls in toilets and bathrooms in their homes. In order to prevent such accidents, systems combining a camera and a fiber grating visual sensor, a type of device that acquires 3-dimensional information, have recently been proposed to acquire body movement and respiratory signals of a bather and detect an arrest in his or her respiration [1-3]. In addition, a sensor has also been proposed to divide the detection area into 64 (8×8) regions and detect the movement of a bather based on the brightness of individual regions using a high-resolution, high-sensitivity CCD camera [4]. However, cameras cannot be installed in restrooms and bathrooms because of privacy. Moreover, many people feel uncomfortable about being filmed by a camera even in public places, and in recent years, the need for the preservation of privacy has been expressed. These factors have given rise to the need for a system that enables the discrimination of the condition or position of a person through a method that does not use the conventional security camera. On the other hand, a method has been proposed by which pyroelectric temperature sensors, as are generally used, detect the presence or absence of a person with infrared radiation [5]. This method turns the system on when a person enters the sensor's detection area and turns the system off when the person leaves the detection area or when the person is static to monitor changes over time; thus, this method cannot differentiate details down to a person's status and movement indoors. In addition, a system has been proposed to obtain the 2-dimensional distribution of infrared radiation using infrared cameras with an infrared sensor array [6]. This system can detect a person's shape and movement in