Image-to-sound Processing and Conversion System to Offer Environmental Perceptions to Visually-Impaired Individuals by using an Alternative Acoustic Language

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The purpose of this project is to develop a computer-based system that will allow visually-impaired individuals to perceive sounds that replace visual information, and enable a trained user to employ it as a special and alternate language. Information of the outline of surroundings elements is obtained through computerized vision libraries. This information is translated into a special sound language by means of an algorithm that takes advantage of the contour of objects, as well as the frequency and the length of the sound waves. A training method is designed for the interpretation of the acoustic language, which uses raised images with the corresponding sounds. The application of computerized vision libraries provides images with the outline of elements in different spaces among a high level of noise, which is optimized by the application of filters that suppress non-essential details. The translation algorithm is capable of converting unidimensional images into sound waves, which are amplified to two-dimensional images by applying sound wave multiplication in order to cover multiple lines. During training, visually-impaired users have been able to recognize up to 80% of the sounds representing the images of the training method. The project demonstrates the possibility of providing visual information to visually-impaired individuals, taking advantage of their sense of hearing. It also proves the brain’s ability to undergo a switch process; this includes processing audio patterns and interpreting them as visual information.

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