Figure-Ground Segregation of Video in an Autonomous Decentralized Approach

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Humans have many outstanding capabilities which cannot be carried out even with present-day computer technology. The very flexible recognition capability by vision is one of them. The nerve cells which bear such flexible recognition processing run in several 100Hz. On the other hand, the calculation speed of today's computers exceeds 1GHz. Even with seven orders of the speed difference, a high-speed and highly precise recognition system like humans has not been realized yet.

A key to such flexible recognition is that nerve cells work in an autonomous decentralized manner. It is said that there exist about 15 billion nerve cells for recognition in a human brain. These nerve cells are locally connected each other by synapses. The recognition processing of humans is performed by local parallel information exchange among the huge number of nerve cells.

Thus we adopt an autonomous decentralized approach for image processing, especially figure-ground segregation. Moving objects in video (Fig. 2) which may consist of random dot texture (Fig. 1) can be detected by pixelwise local parallel computation. Figure 3 is an example of an application to real image processing. We hope that such autonomous decentralized image processing will achieve high-speed and highly precise image recognition like humans.

Keywords: Optical Flow, Reaction Diffusion Equation, Figure-Ground Segregation

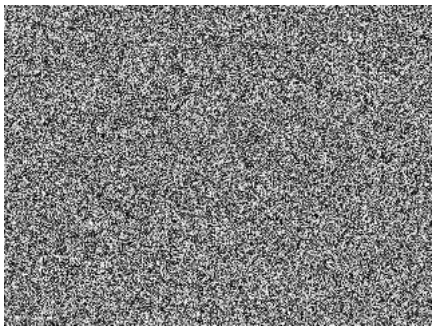

Fig.1 Random-Dot Texture

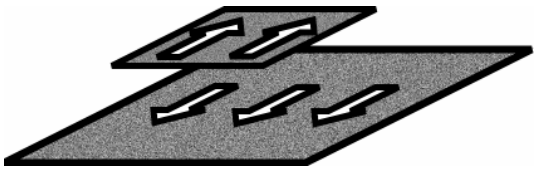

Fig.2 Random-Dot Kinematogram

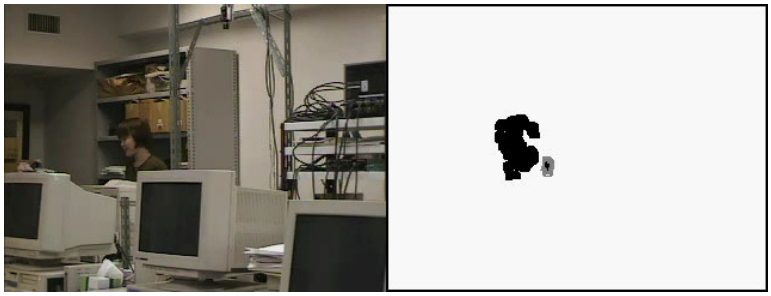

Fig.3 An Example of Figure-Ground Segregation