The dialectical architecture of visual intelligence where every activity is available as a tool for the next activity

[ECVP'05]

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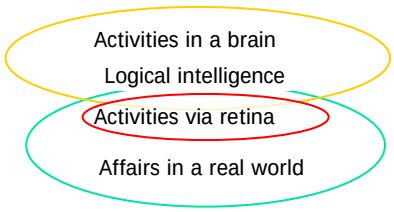
Objectives

[Objectives]
To present the tools for designation of devices where camera is controlled by the visual perception in which plural subsets of activities interact dialectically.

[Items] .

- The biological intelligence that interacts directly with a real world.
- Architecture of intermittent interactions among perception of the image on fovea and the real world.
- CMOS Circuits for the visual intelligence.

Biological intelligence > Visual intelligence >Logical intelligence



A vision is direct interactive activities in a real world.

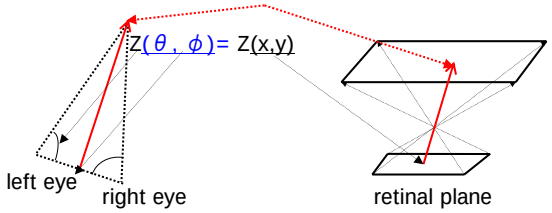
Activities in a real world for visual perception

[Time-shared operations for a focused attention]

- The fine grain analyzer of the fovea is shifted rapidly from one item to another by means of eye movements.
- The focused point is transferred from one part to another.
- The consciousness selects the activity with top priority in the associative area where the causality is stored in a form of route.

The depth perception is carried out in a real world.

Focused point exists **in the real world**



Depth is measured from data on eye axes.

A position in a retina (x,y) is assigned by angle (θ , φ).

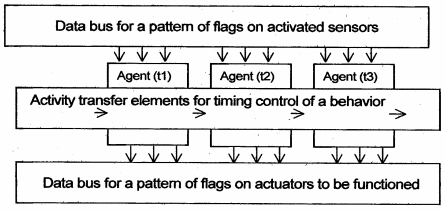
Scanning on a real world for measurements of Z(x,y)

Segmentation of view field B(x,y) is achieved the data on depth Z(x,y)

- The segmented areas are listed in a register.
- Visual perception on a focusing area is carried out by using array of decoder or filters.
- The layered processes of vision are carried out time sharing operations.
- The feature perception and the depth perception are linked and the learning makes possible to estimate the distance from the size of image on the retina.

A transference of activity is represented by that of impulse.

Each transference of activity ends at its output and processes are programmed according to the object of surveillance.

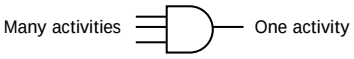


Logics on a neuron (The reaction represents an IF-THEN rule)

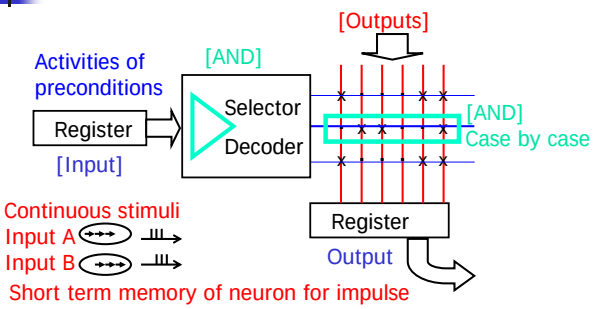
A neuron transfers many activities to one activity.
The unification of activities is achieved by a neuron.

- A reaction operates production rule of an If-then rule.
- The data compression is a decoder or a filter.
- The layered structure of paralleling filters with decoder economizes the circuit and it possess superior adaptabilities.

A neuron operates as a of decoder or a filter



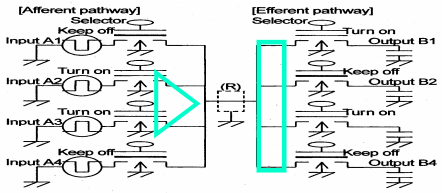
The circuits that operates the function of a neuron



Short term memory of neuron for impulse

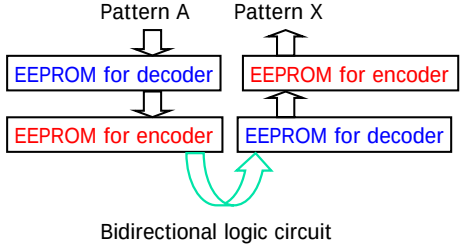
MOS circuits for Programmable pattern translator

The operation is carried out by using the signal source in which low level signal is provided via comparatively smaller resistance than high level.



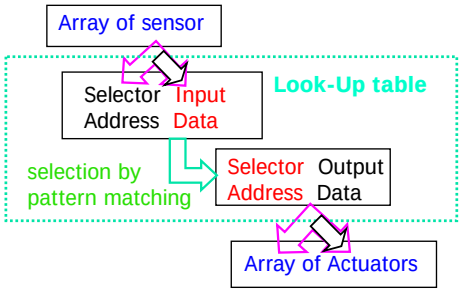
[AND] ↔ [AND]
for one case

Connections are available to use bi-directionally



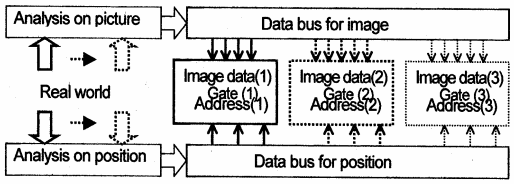
Bidirectional logic circuit

Operation of Look-Up Table



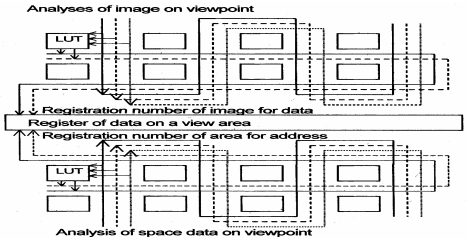
LUT for visual perception

The data those are picked up through general analyses are listed on a register in order to analyses.



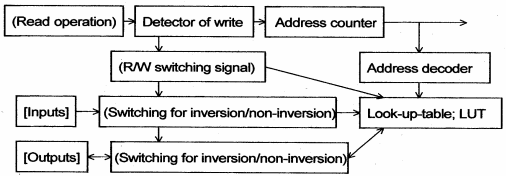
Data compression by LUT

Paralleling set of decoder function as the set of references.
The matrix arrangement of LUT are connected in parallel.



Switching of Read/Write

The technology of MOS memory such as DRAM SRAM and Flash memory are available for the timing control of the system.



Rules for visual perception

The secondary visual analyses deal with context effects.

- The calculation of function similar to zoom lens is carried out for the normalization of number on pixels.
- A decoder unifies a pattern of activity. A shape is recognized by means of a decoder.
- The behavior is triggered by the cognitive activity of top priority.

A data conversion for down-sizing of number on pixel

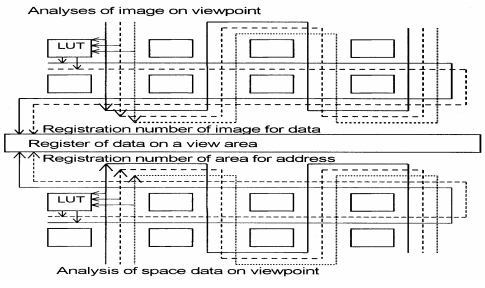
Normalization of data bus for pattern perception
Pixel size on every image is adjusted by a normalization.
The number of down sizing stage is assigned from the difference between the size of image and that of reference. Then, a datum on a pixel is obtained from the surrounding pixels.

The assignment on data translation.

Each step of processing decreases **one row and one line**.

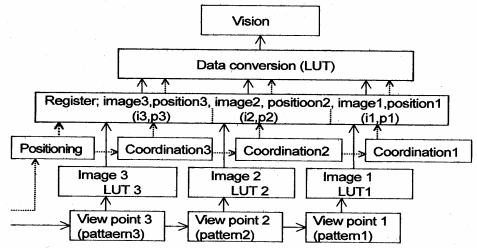
Intermittent pattern recognition by means of normalized references

A pattern is recognized by a decoder of normalized references.



Organization of layered LUT for synthesis of consciousness

A register for arrangement of visual perceptions on constituents and a decoder for the conscious perception.



Visual intelligence for behavior control

A behavioral faculty is formed through activities

- An agent is decoded in a form of circuits those are available to playback.
- The circuits are available as a tool for the next activity.

Selection of agent is programmed as a reward-based learning.

- Since the biological intelligence is dialectical, it is always under construction
- The visual intelligence is obtained without language use, but a linguistic expression is available as a symbol of integrated activities.

Conclusions

- The concept of activity is able to explain the first stage of intelligence i.e. biological intelligence > visual perception > logical intelligence.
- The transference of unit of activity is represented by means of transference of some amount of of electrons.
- The data on an image is able to implement directly from the signals those come from real world.
- The activity transfer system for vision is possible to manufacture by using today technology of dynamic CMOS and flash memory.