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# Brain Tumor Detection Using Honey Bee

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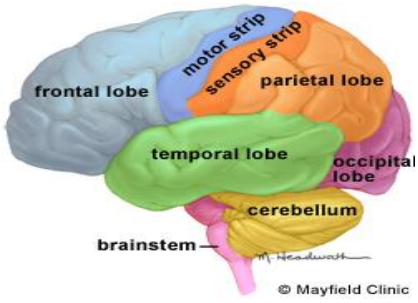
**Abstract:- In present time, in medical line there are many techniques have been researched for detect the TUMOR from human brain (medical image). Many techniques are available, Brain cancer detection in magnetic resonance images (MRI) is important in medical diagnosis because it provides information associated to anatomical structures as well as potential abnormal tissues necessary to treatment planning and patient followup. In this paper, Here two techniques are used for enhanced and detect edges using PSO and Honey bee (HB). Here detect the tumor using morphological operation through honey bee algorithm. Here in this work we take MRI images for applying honey bee (HB). Detect the TUMOR from enhanced image using honey bee algorithm using morphological operation. There are many steps for detect the tumor using morphological operation. Morphological operations are affecting the form, structure or shape of an object. Applied on binary images (black & white images – Images with only 2 colors: black and white). They are used in pre or post processing (filtering, thinning, and pruning) or for getting a representation or description of the shape of objects/regions (boundaries, skeletons convex hulls). The two principal morphological operations are dilation and erosion . Dilation allows objects to expand, thus potentially filling in small holes and connecting disjoint objects. Erosion shrinks objects by etching away (eroding) their boundaries. These operations can be customized for an application by the proper selection of the structuring element, which determines exactly how the objects will be dilated or eroded.**

**Keywords:-** Tumor, Honey Bee, Morphological images, image enhancement.

**Introduction:-**

**Brain Tumor:** A tumor is an abnormal growth of body tissue. In general tumor occurs when cells divide and grow excessively in a body. Tumor originally means swelling. Tumors can be cancerous or noncancerous. In the body, cells grow in controlled manner as new cells replace old cells. That means old cells vacate their places for new cells to perform different functions. If there is any type of disturbance in cell divisions, tumor can form. There can be much type of tumors. One of the most studied is brain tumor. Brain tumor is abnormal growth of cells in the brain. It is defined as any intracranial tumor created by abnormal or uncontrollable cell division. Brain tumor can be primary which starts in the brain or secondary tumor which spreads to the brain from another area. Brain tumor is also can be cancerous or noncancerous. There are many treatments for different types of tumors depending upon the size or location of tumor.

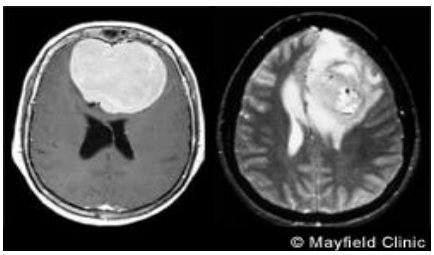



**Human Brain**

Brain is a soft, spongy mass of a tissue. It is protected by,

- The bones of skull
- Three layers of tissues
- Watery fluid, which flows within the brain.

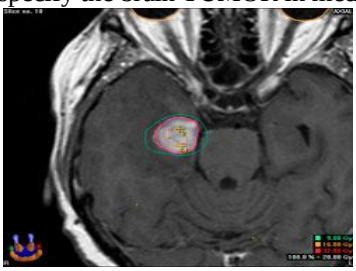
Normally, cells grows old and or get damaged, finally they die. Sometimes, this doesn't happen as old cells don't die or normal cells are formed when body don't need them. This results in extra growth of cells which forms a tumor. Primary brain tumors can be benign or malignant. Benign tumor does not cause cancer. They can be cured easily as their cells can be destroyed easily. Malignant tumor can contain cancer cells. This type of tumor is more dangerous and life threatening. They grow really fast and get crowded very rapidly in the brain. People can get tumor at any age. There are many symptoms of brain tumor like headaches, nausea and vomiting, changes in speech and vision etc. Radiation therapy kills tumor cells with high energy x-rays, gamma rays, or protons. Other way to cure tumor is chemotherapy i.e. by use of drugs to kill cancer cells. Following is the picture showing tumor in the brain.



**Tumor In Human Brain**

Magnetic Resonance Imaging (MRI) techniques are still developing, and recent efforts have been directed primarily at improving image quality and speed of acquisition. MRI provides non-invasive, high quality images of neuro-anatomy and disease processes. There are many sequences that can be used on MRI and the different sequences often provide different contrast between tissues so the most appropriate sequence should be chosen according to disease.

**Brain Tumor Detection:**In present time, in medical line there are many techniques have been researched for detect the TUMOR from human brain (medical image). Here in a medical image here specify the brain TUMOR in medical brain images.



**Show TUMOR in medical image**

Many techniques are available, Brain cancer detection in magnetic resonance images (MRI) is important in medical diagnosis because it provides information associated to anatomical structures as well as potential abnormal tissues necessary to treatment planning and patient followup. MRI technique is suitable for detect the tumor but in modern world many techniques are present.

**Honey Bee (HB):-**Swarm intelligence has become a research interest to many research scientists of related fields in recent years. However, the term swarm is used in a general manner to refer to any restrained collection of interacting agents or individuals. The classical example of a swarm is bees swarming around their hive; nevertheless the metaphor can easily be extended to other systems with a similar architecture. An ant colony can be thought of as a swarm whose individual agents are ants. Similarly a flock of birds is a swarm of birds. An immune system is a swarm of cells and molecules as well as a crowd is a swarm of people. Particle Swarm Optimization (PSO) Algorithm models the social behavior of bird flocking or fish schooling.

**Figure : Honey bee**

Two fundamental concepts are necessary and sufficient properties to obtain swarm intelligent behavior. Following these two concepts are discussed in this chart. Self-organization can be defined as a set of dynamical mechanisms, which result in structures at the global level of a system. These mechanisms establish basic rules for the interactions between the components of the system. The rules ensure that the interactions are executed on the basis of purely local information without any relation to the global pattern.

**i)** Positive feedback is a simple behavioral "rules of thumb" that promotes the creation of convenient structures. Recruitment and reinforcement such as trail laying and following in some ant species or dances in bees can be shown as the examples of positive feedback.

**ii)** Negative feedback counterbalances positive feedback and helps to stabilize the collective pattern. In order to avoid the saturation which might occur in terms of available foragers, food source exhaustion, crowding or competition at the food sources, a negative feedback mechanism is needed.

**iii)** Fluctuations such as random walks, errors, random task switching among swarm individuals are vital for creativity and innovation. Randomness is often crucial for emergent structures since it enables the discovery of new solutions.

**iv)** In general, self organization requires a minimal density of mutually tolerant individuals, enabling them to make use of the results from their own activities as well as others.

**a)** Inside a swarm, there are different tasks, which are performed simultaneously by specialized individuals. This kind of phenomenon is called division of labour. self-organization and division of labour are necessary and sufficient properties to obtain swarm intelligent behaviour such as distributed problem-solving systems. Honey bee swarms consists of three essential components.

- **Food Sources:** The value of a food source depends on many factors such as its proximity to the nest, its richness or concentration of its energy, and the ease of extracting this energy. For the sake of simplicity, the "profitability" of a food source can be represented with a single quantity .
- **Employed foragers:** They are associated with a particular food source which they are currently exploiting or are "employed" at. They carry with them information about this particular source, its distance and direction from the nest, the profitability of the source and share this information with a certain probability.
- **Unemployed foragers:** They are continually at look out for a food source to exploit. There are two types of unemployed foragers: scouts, searching the environment surrounding the nest for new food sources and onlookers waiting in the nest.

In recent years, new optimal multilevel thresholding algorithms are developed to improve formerly methods, such as the histogram equalization, particle swarm optimization (PSO) technique and the hybrid cooperative-comprehensive learning

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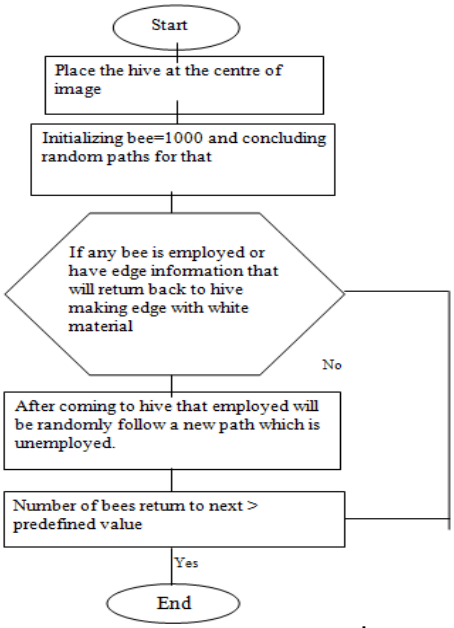
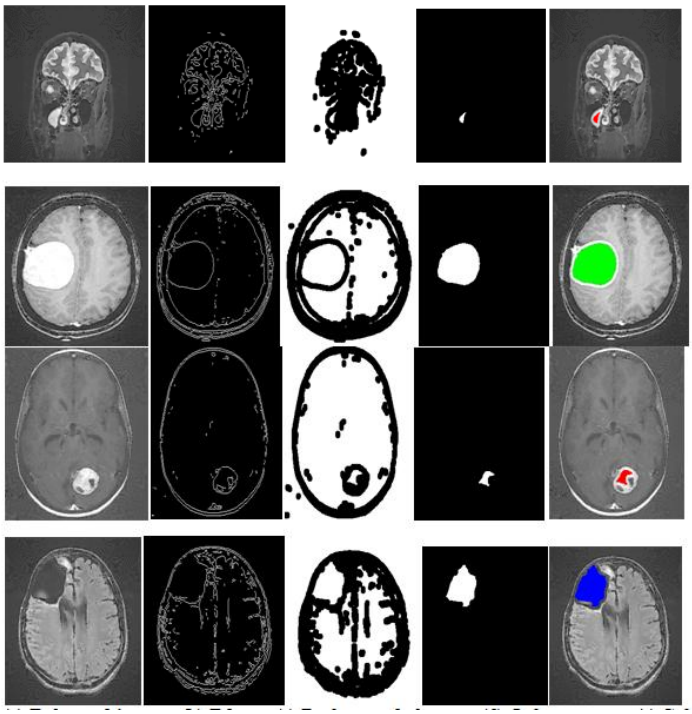
based PSO algorithm. Besides, over the last decade, modeling the behavior of social insects, such as ants and bees, for the purpose of search and problems solving has been the context of the emerging area of swarm intelligence. Honey-bee mating optimization (HBMO) may also be considered as a typical swarm-based approach for optimization, in which the search algorithm is inspired by the process of mating in real honey-bees. One is that the results of PSO and Fast Ostu's method are unstable that extraordinary segmentations are generated. Another is that the results of HCOCLPSO are superior to original PSO method, but it still slower than ones of HBMO and it had similar segmentation results with the ones of the honey bee mating optimization. In many clinical applications, we need to combine different images together for insightful observation, and the registration will be needed to align the structure and border between different brain images. The basic concept of registration is to obtain the geometric transform that optimizes. In recent years, the Powell's optimization has been the most popular method used to optimize MI. However, if the geometric condition of source image is quite different from the target image, the registration process may be trapped in local solutions when using the Powell's method. In the synthetic experiments, the Powell's method becomes not as reliable as usual if the intensity distribution or shape of the source and target images are of a certain amount of difference. Honey bee algorithm is used for registration for an image, to obtain the optimal registration. Honey bee algorithm can be used for solving uni modal and multi-modal numerical optimization problems. Honey bee algorithm is very simple and very flexible when compared to the existing swarm based algorithms. It is also very robust, at least for the test problems.




**Flow chart of honey bee algorithm (HB)**

**Results:**

Here two techniques are used for enhanced and detect edges using PSO and Honey bee (HB). Here detect the tumor using morphological operation through honey bee algorithm. Here in this work we take MRI images for applying honey bee (HB).



**(a) Enhanced image (b) Edges (c) Background change (d) Only tumor (e) Coloured tumor**

Many techniques are used in medical line for detect the TUMOR. Using MRI methods are used for detect the tumor like through segment of a medical image, through artificial neural network, through fuzzy clustering but in this work we use the morphological operation for detect the TUMOR. After applying honey bee algorithm one enhanced image is saved. Detect the TUMOR from enhanced image using honey bee algorithm using morphological operation. There are many steps for detect the tumor using morphological operation. Morphological operations are affecting the form, structure or shape of an object. Applied on binary images (black & white images – Images with only 2 colors: *black* and *white*). They are used in pre or post processing (filtering, thinning, and pruning) or for getting a representation or description of the shape of objects/regions (boundaries, skeletons convex hulls). The two principal morphological operations are *dilation* and *erosion* . Dilation allows objects to expand, thus potentially filling in small holes and connecting disjoint objects. Erosion shrinks objects by etching away (eroding) their boundaries. These operations can be customized for an application by the proper selection of the structuring element, which determines exactly how the objects will be dilated or eroded.

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**Conclusion:-**

The objective of the algorithm was to maximize the total number of pixels in the edges thus being able to visualization more details in the images. The algorithm is tested on medical images for TUMOR detection. It is clear from the obtained result that the proposed HB based image enhancement is better for image enhancement and Tumor detection in term of quality solution and computational efficiency. In this the work is done on medical ( Brain) images. It can be done on other medical images like kidney, breast, knee, neck. This algorithm can also be implemented in hardware as well.

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