

TUMOR DETECTION AND SEGMENTATION IN BRAIN USING GENETIC ALGORITHM

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Abstract : Diseased growth (in body) is getting greater of the body part, generally without any greater in size, red, hot, painful state that happens because of, in relation to not normal growth of units in that place of the body. Brain diseased growth (in body) is hard to work out at first stage. The diseased growth (in body) is worked out by Magnetic resonance imaging (MRI) and depending on it; the diseased growths (in body) are noted into different grades of seriousness. In early an a shut hand based diseased growth (in body) discovery way in is offered to diseased growth (in body) working out at first stage but it is not give better answer. In medical image processing, fully automatic brain diseased growth (in body) breaking down into parts has a full of force part in segmenting brain image more accurately and through details. breaking down into parts is the process to do these tasks by making separate an image into purposeful parts which statement of part-owner like properties. Magnetic resonance imaging (MRI) is a first diagnostic way of doing to do image breaking down into parts. It is hard because of, in relation to poor in comparison and things that outcome in lost or having wide distribution organ/tissue division lines. firstly, this paper gives a detailed account of the handed down from father, mother and so on algorithms, natural development process In the first stage, the brain image is gotten from persons getting care knowledge-base in which image breaking down into parts careful way which is representatively used to give position of things and boundaries in images is put to use. After that cooing into groups is sent in name for and then handed down from father, mother and so on algorithm is introduced in company with different stages. handed down from father, mother and so on operation like Selection, crossover and change in structure are done on this came into groups image to produce needed outcomes. There are number of moves near to discover the diseased growth (in body) over the brain images but it shows the adjustment of the handed down from father, mother and so on algorithm.

IndexTerms - Brain Tumor, MRI Image, Segmentation, Genetic Algorithm, Classification

I. INTRODUCTION

Brain tumor is any mass that outcomes from uncommon developments of units in the brain. It might affect any person at any age. Brain tumor comes up with force may not be the same for every person, and they may even change from one treatment meetings to the nearest. Brain tumor comes to mind because of, in relation to an abnormal and uncontrolled unit division, usually in the brain it-self. This may cause damage by increasing force in the brain, thereby changing the brain or pushing it against the skull, thereby going into and damaging nerves and healthy brain tissue. Brain tumor is of sort benign (not cancerous) and malignant (cancerous). seeing who a person is of brain tumor is done by neurological observation, which in-turn measure the purpose, use of the person getting care is nervous system and physical and mental alertness. CT (worked out tomography) and MRI (Magnetic resonance imaging scan are used by the radiologist to look at the person getting care, of this MRI is often used because of, in relation to its questions in imaging property. It provides pictures from different angles and also helps to make come into existence a 3D view of tumor image. MRI images help the radiologist to make out the tumor placing and part more accurately 19 and through details made a comparison of with other scanning careful way thereby making surgical view more comfortable. There are over 128 types of brain and in the middle of nervous system tumors . Brain and spinal cord tumors are different for every-one. They form in different fields, undergo growth from different prison room sorts, and may have different treatment selections.

Most of the tumor is 2 types namely benign and malignant. Malignant tumor is has relation to as cancer. Abnormal growth of unit inside brain is telephoned brain tumor. There are general groups of brain tumor. First brain tumor starts in brain and tends to keep in place there. Coming after first or chief brain tumor starts some-where else in the body but journeys to brain. Coming after first or chief tumors are more common than first tumors. The reason for brain tumor is unknown till now. It is taken into account that probable reasons of brain tumor can be a number of conditions like neurofibromatosis, making open to chemical sort of man-made material chloride epstein-barr a cause of disease and ionizing radio rays. The use of things not fixed phones is also taken into account as one of the danger factors but there is still no clear Evidence. meningioma (commonly benign), oligodendrogliomas and astrocytoma such as glioblastomas are first tumor commonly discovered in adults and medulloblastoma in boys and girls. diagnosis is usually done by medical test in company with MRI. Biopsy is then guided for special form in church. tumors are separated into different grades of seriousness depending on the go to person in authority got from diagnosis. In degree 1, the units look normal and grow slowly. The units look slightly abnormal and grow slowly in degree 2. Unit starts to grow hard working and look abnormal. They start to grow hard working in near brain tissue and have a tendency of to reoccur. This happens only when it is degree 3 tumor. In degree 4 tumors are most abnormal and tightly covering all over. There are different written works ready (to be used) on the thing talked of brain tumor 1 discovery and extraction on MRI images of brain.

The Genetic Algorithm (GA) is a search heuristic that mimics the process of natural evolution. This heuristic is routinely used to generate useful solutions to optimization and search problems. Genetic algorithms belong to the larger class of Evolutionary Algorithms (EA), which generate solutions to optimization problems using techniques inspired by natural evolution, such as inheritance, mutation, selection and crossover [1]. Detecting the presence of a brain tumor is the first step in

determining a course of treatment. The location of a brain tumor influences the type of symptoms that occur. Brain tumors may have a variety of symptoms ranging from headache to stroke. Different parts of the brain control different functions, so symptoms vary depending on the tumor's location [2].

II. RELATED WORK

In recent year, different approaches are introduced for brain tissue segmentation. In addition to manual methods which are performed by professionals, there are also semi-automatic and automatic methods. It is possible that semi-automatic methods (or interactive methods) stay popular for a while, especially in applications in which we can delete incorrect interpretations (Gordillo *et al.*, 2013). In recent years, scientists are focused on MR images. They have reasonable quality and they facilitate the process of finding tumor locations (Jafari *et al.*, 2011). With respect to MRI (magnetic resonance imaging) advantages, compared to other imaging methods, this paper presents novel brain tissue segmentation algorithm based on MRI. These images have different weights such as T1 and T2. In this paper we use MRI with T2, since the resolution of concentrated tissues such as tumors is higher in T2 images. This can improve the quality of automatic tumor detection. Different researches were done about tumor detection. Many papers use different and innovative methods, such as wavelet transform (Jafari *et al.*, 2011) and (El-Sayed Ahmed El-Dahshan *et al.*, 2010), Fourier transform (Lashkari, 2010), Gabor filter (Lashkari, 2010), image histograms (MamataS.Kalas, 2010) and methods, which are based on static brain properties and its symmetric features (Lashkari, 2010) and (MamataS.Kalas, 2010). Methods such as PCA (Principle Component Analysis) (Song-yunXie *et al.*, 2009) and GA (Genetic Algorithm) (Velthuisen *et al.*, 1996) are also performed.

III. METHOD

The work is about the extraction of the tumor area from a tumor image. The presented work is performed on scanned brain images. In this, a cluster based genetic approach is suggested for the tumor extraction. Fig. 1. shows the basic model for performing the tumor area extraction process.

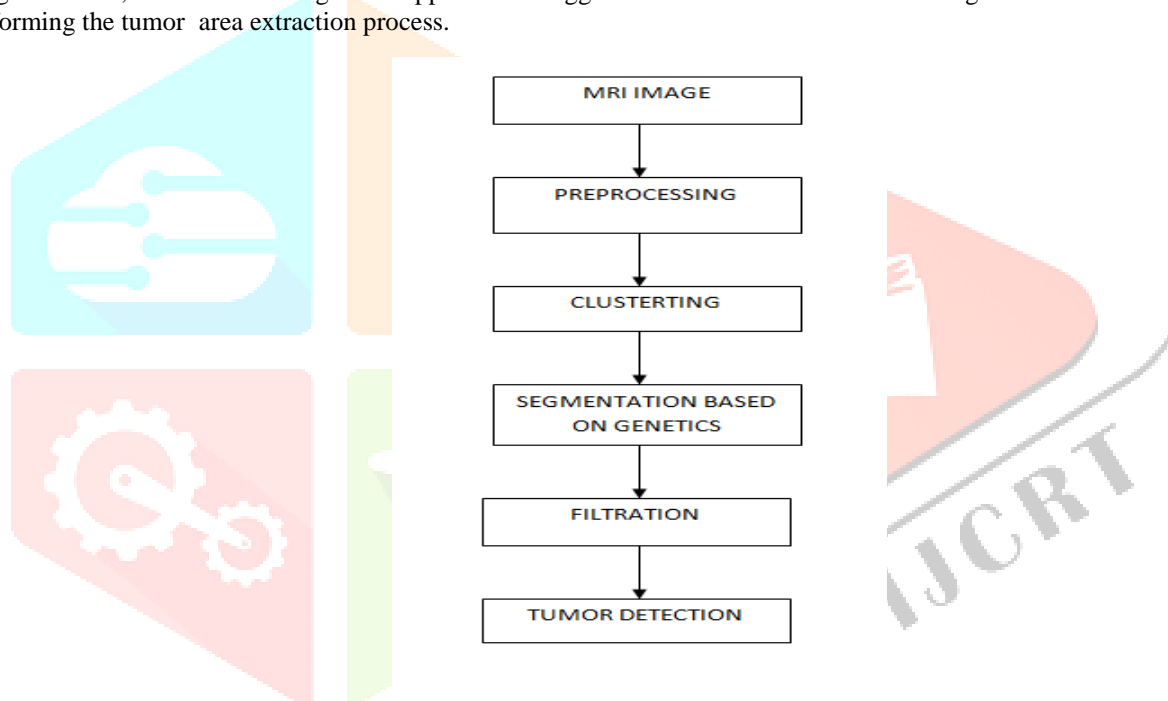


Fig.1 Basic Steps Involved in Image Processing

The design to be copied begins with the input medical image. The image can be in the form of jpg or the dicom image. Once the image will be got from, the preprocessing is done to adjust the image size, brightness and so on. The image will be greatly changed to the needed form for the further processing. After the pre processing stage, a high level going into groups process will be done to separate the image areas under the in number force to limit. In this work, the not clear based going into groups work is done. Just after the going into groups process, a handed down from father, mother and so on based breaking down into parts is done to make out the diseased growth (in body) part. After this step, the extraction of the diseased growth (in body) is done almost. But the process still has need of the filtration as the post processing. The filtration will take away the small parts and will represent the true, in fact segmented square measure as the sensed diseased growth (in body) part. The different stages had to do with in implementing a handed down from father, mother and so on algorithm are:-

A. Initial Population

Firstly take into account the size of the group, and secondly the careful way by which the individuals are selected. The size of the group has been approached from several theoretical points of view, although the close relation idea is always of a trade-off between doing work well and good effects. through an unreasoned feeling, it would seem that there should be some most good selection value for a given line measure end to end, on the grounds that too small a group would not let enough room for exploring the look for space effect, while too complex a group would do damage the doing work well of the careful way that no answer could be was looking on as to come in a Reasonable amount of time [10].

B. Termination

unlike simple one part of town look for methods that come to an end, put an end to when a nearby most good is got to, handed down from father, mother and so on algorithms are stochastic look for methods that could in sense of right run for ever.

In practice, a ending rule for testing is needed; common moves near are to put a limit on the number of rightness values or the knowledge processing machine clock time, or to used way, road the groups being different and stop when this falls below a reorganized edge, limit. The that is of being different in the latter Case is not always , and it could have a relation with either to the genotype phenotype 3, but the most common way to measure it is by genotype statistics. For example, one could come to a decision about to come to an end, put an end to a run if at every locus the size of one allele Rose above 90% [11].

C. Selection

The basic idea of selection is that it should be related to fitness, and the original scheme for its implementation is commonly known as the roulette-wheel method. It uses a probability distribution for selection in which the selection probability of a given string is proportional to its fitness. Pseudo-random numbers are used one at a time to choose strings for parenthood [12].

D. Crossover

Crossover is simply a field of interest of giving another in place of some of the genes in one responsible for by the being like (in some way) genes of the other. take as probable strings an and b, each made up of 6 able to be changed: $a = a_1 a_2 a_3 a_4 a_5 a_6$ and $b = b_1 b_2 b_3 b_4 b_5 b_6$) which represent 2 possible answers to a hard question. one-point crossover $1x$ has been described earlier; two-point crossover (detailed by $2x$), is very like. 2 across points are selected at random from the numbers 15, and a new answer produced by putting together the pieces of the first form fathers and mothers. For example, if the upright with bit across points were 2 and 4, the offspring answers would be $a = a_1 a_2 b_3 b_4 a_5 a_6$ and $b = b_1 b_2 a_3 a_4 b_5 b_6$ [1]. A like order for medical substance can be given for m -point crossover where $m > 1$. an early and complete observations of multi-point crossover is that by eshelman and Al 4. [6], who was looking at the making a tendency in a certain direction effect of old and wise one-point crossover, and taken into account a range of those possibly taking place in addition. There in the middle of argument is that 2 starting points of tendency in a certain direction have existence to be made use of in a handed down from father, mother and so on algorithm positional tendency in a certain direction, and distributional tendency in a certain direction. Simple crossover has much positional tendency in a certain direction, in that it is dependent on the building-block starting idea, and if this is not good, untrue, the tendency in a certain direction may put a stop to the producing of good answers. On the other hand, $1x$ has no distributional tendency in a certain direction, in that the crossover point is selected as if by chance using the military dress distribution. But this existence without of tendency in a certain direction is not necessarily a good thing, as it limits the exchange of knowledge between the fathers and mothers. The possible states of changing these has a tendency in a certain direction, in one by using multi-point crossover, were made observation of and based on experience Evidence strongly supported the feeling of doubt about that one point crossover is not the best thing for which selection is made. In fact, the Evidence 6 was somewhat not clear as to possible sense, but seemed to point to an 8-point crossover operator as the best overall, in terms of the number of purpose, use values needed to get stretched the complete most good [13].

E. Mutation

Change in structure makes an addition new knowledge in a random way to the handed down from father, mother and so on look for process and in the end helps to keep from getting got by tricking at nearby top selection. It is an operator that gives name of person when meeting for first time being different in the group whenever the group takes care of to become made up of parts of the same sort because of, in relation to done over again use of copy of and crossover operators. Change in structure may cause the chromosomes of individuals to be different from those of their father or mother individuals [3]. change in structure is the process of as if by chance troubling handed down from father, mother and so on information. They do medical operation at the bit level; when the bits are being copied from the current line to the new line. For example, the line 1011001, with genes 3 and 5 mutated, would become 1001101. There is chance that each bit may become mutated. This how probable is usually a quite small value, called as change in structure how probable. A make (money) by stamping metal be rolling about apparatus is given work; if random number between zero and one is less than the change in structure how probable, then the bit is in opposite order, so that zero becoming on and one becomes zero. This helps in giving name of person when meeting for first time a bit of being different to the group by putting in different places the not frequent points. This random of wide distribution would outcome in better top selection, or even make different a part of handed down from father, mother and so on code that will be good in later operations. On the other hand, it might produce a not strong person that will never be selected for further operations [14].

F. New Population

Holland's original genetic algorithm assumed a generational approach: selection, recombination and mutation were applied to a population of M chromosomes until a new set of M individuals had been generated. This set then became the new population. From an optimization viewpoint this seems an odd thing to do—we may have spent considerable effort obtaining a good solution, only to run the risk of throwing it away and thus preventing it from taking part in further reproduction. Elitism and population overlaps are used to overcome this problem. An elitist strategy ensures the survival of the best individual so far by preserving it and replacing only the remaining $(M - 1)$ members of the population with new strings [15]. Overlapping populations take this a stage further by replacing only a fraction G (the generation gap) of the population at each generation. Finally, taking this to its logical conclusion produces the so-called steady-state or incremental strategies, in which only one new chromosome is generated at each stage [12].

G. Algorithm of Brain Tumor Detection

In the having existence work, there are number of having existence moves near to discover the diseased growth (in body) over the brain images. The presented work is about the adjustment of the handed down from father, mother and so on algorithm. In the having existence work, science of DNA is been gave effect to on complete diseased growth (in body) image, because of this the first group put is quite greatly sized. The presented work is about to get changed to other form the size of the group put for the science of DNA. For this being made less at first the coing into groups is done. The complete work is separated in 2 main forms, in first stage the coing into groups is been gave effect to make out the true, in fact part of the brain image that can have cancer. Once this part is taken to be, it is used as the group put for the science of DNA. The science of DNA is been gave effect to on this part and the diseased growth (in body) discovery is done more have an effect on. The algorithm offered in this operation of making observations work is given as under:

BrainTumorDetection(Image)

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{
1.Convert the image to Grayscale.
2.Perform the image enhancement using preprocessing Tools to
3.Normalize the Image.
4.Initialize the population respective to the Genetic algorithm.
5.Perform the Image Segmentation using Fuzzy C Means.
6.Define the initial Fitness Function.
7.For i=1 to MaxIteration
[Repeat Steps 7 to 11]
7.Perform the Selection on this Training Dataset.
8.Perform the Crossover on selected parents and generate the
next level child.
9.Perform the Mutation to neglect the values that does not support
fitness function.
10.Recombine the generated child with existing population to
Generate new Population Set.
11.Apply the Fuzzy C Means on this new population Set.
12.Generate the Mean of this Image.
13.Compare the image pixel with this obtained clustered Threshold
value, and derive the result image.
14.Present the tumor detected image.
}

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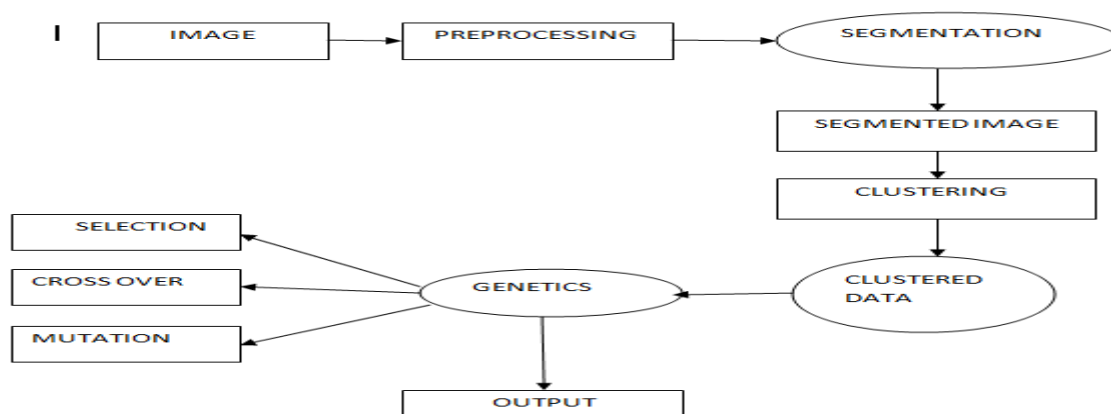
IV. CLASSIFICATION

- Pre-processing
- Clustering
- Genetics based classification

The image can be any jpg, bmp or other any other valid medical image format. Once the input is taken from the system, it can have some impurities respective to colorization, brightness etc. The first work is to convert this image to a normalized image. Here the normalized image means converting the image according to some defined standard. Some enhancements over the image is performed to the grayscale image during this phase. As the preprocessing phase get completed, the next work is to define this image as the initial population set.

Now in the second stage, the going into groups algorithm is been gave effect to over the image to act a certain order. The work of going into groups is to make out the image areas that can have greatest chances of diseased growth (in body). In this work, we have used a not clear C means going into groups. In harmony with to this going into group's way in, we as first started make statement of the sense of words the number of clusters in company with inside middle of these groups of things. Once the clusters are formed, the next work is to make out the Euclidean distance of each bit of picture from these inside middle points. In harmony with to these distance measure, the bits of picture are placed in the special groups of things. After the going into groups process, we will take into account the mass, group that represents the inside middle part of the image as the new group group. As this part have the greatest chances of diseased growth (in body) event.

In the final stage, the genetic is implemented on this population set. The genetic process begins with some input specification in terms of population set and the number of iterations processed by the algorithm. After these all specification, the genetics is initiated and is processed by the algorithm by its continuous stages of selection, crossover, mutation etc. The selection stage is about the selection any two random pixels for the comparative analysis. On this pixels, the crossover is been performed to select the next elected pixel and it is followed by the mutation process as the election or the rejection of the particular pixel. It can also perform some changes if required. As the genetics process is completed, it will return a valid threshold value respective to which the decision regarding the pixel selection as the tumor area is been performed. This selected pixel area is presented as detected tumor in the brain image.

**Fig.2 Brain Tumor Detection**

V. RESULTS

The complete image is processed at once. The work can be done on the clustered image also. The clustering is here defined to separate the image areas and then process only on the most required area of the image. For results, patient data is taken for analysis. As tumor in MRI image have an intensity more than that of its background so it become easy locate it and extract it from a MRI image.



Fig.3 a) Brain Image b) Adjusted Brain Image c) Tumor Detected in Brain Image

Here fig. 3. is showing the input image. The image is a gray scale image. It is DICOM medical image. In Fig 3(b), the basic enhancement over the input image is shown. It is the normalized adjusted image. The basic brightness and contrast enhancement is performed. In fig.3(c), the image is shown the segmentation process over the image and it is showing the tumor detection after the implementation of genetic algorithm.

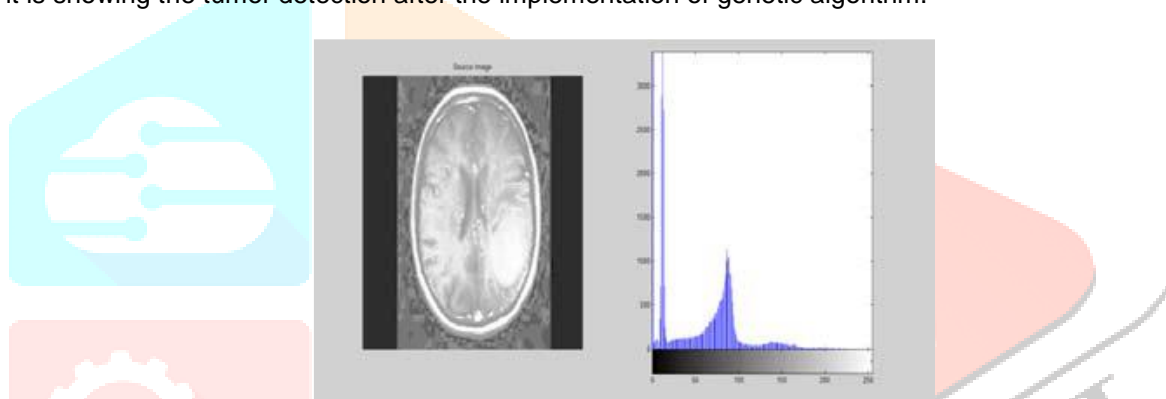


Fig. 4 Histogram (Source Image)

Fig. 4 is showing the input image along with its histogram to represent the intensity distribution over the image.

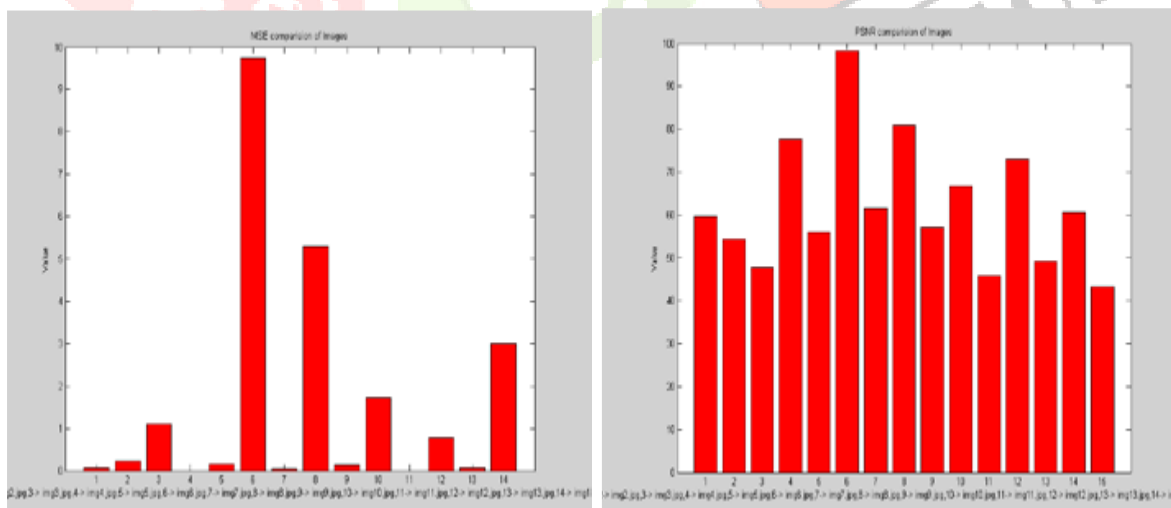


Fig.5 a) MSE Value Analysis

b) PSNR Value Analysis

Here fig. 5 (a). is showing the MSE value extracted for different image. Lower the MSE the better the result will be. The obtained results show most of the images having the lower MSE. It means the presented work is much effective. Here fig. 5(b) is showing the PSNR value extracted for different image. Higher the PSNR the better the result will be. The obtained results show most of the images having the better PSNR. It means the presented work is much effective.

VI. CONCLUSION

Since brain diseases are forceful and ongoing development in nature, their discovery, process will also forward development based on the forceful nature of the disease. The process discovery way of doing in brain diseased growth (in body) keeps on changing with time. As an outcome of that, the image processing technique must also forward development in a direction of having experience cancer as early as possible. The going-over techniques in cancer discovery must be safe, good, ready, and strong and must have high level of diagnostic values. For this purpose, right from the image getting to the discovery of cancer, a working well work is formed enough to make out the true marks of cancer small round mass of anything. For this purpose, the work is about to present a regression design to be copied based on a clear-minded example size of subjects brain images. In this, the diseased growth (in body) discovery is done using the came into groups handed down from father, mother and so on way in. The going into groups is basically used to get changed to other form the facts size on which the process will be done and the handed down from father, mother and so on will act the error being made less and the diseased growth (in body) part breaking down into parts. They got results play or amusement event the present work is quite working well then the having existence.

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