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Retno Supriyanti, Eko Wahyudi and Yogi Ramadhani

Simple Tool for Three-Dimensional Reconstruction of Coronal Hippocampus Slice Using Matlab

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Abstract. Information technology is developing very fast nowadays. In the medical field, one of which is the development of computer-aided diagnosis to strengthen the diagnosis. This paper will discuss the development of simple tools in measuring the volume of the coronal hippocampus slice due to MRI images. Based on this volume measurement, it will be used as the basis for the three-dimensional reconstruction of the hippocampus area. We emphasized 2-D analysis on the three slices of MRI images, both axial, sagittal, and coronal, in previous research. However, previous research results recommend that 3-D analysis will provide more information about the structure of the hippocampus and ventricles. Three-dimensional reconstruction is needed to add variables to measure the symptoms of Alzheimer's disease that we have done in previous studies. In this paper, we only discuss the three-dimensional analysis of the coronal slice. The results obtained indicate that the development of this simple Matlab-based tool can be used as a guideline for developing a better computer-aided diagnosis.

INTRODUCTION

Alzheimer's disease is a disease that affects many elderly patients, where the number is increasing every year.[1][2]. This condition is in contrast to the number of existing health services in developing countries such as Indonesia. This case happens because Alzheimer's is not a disease that has fatal consequences such as cancer, heart disease, kidney disease, etc. Alzheimer's diagnosis is carried out in several stages, one of which is the radiological examination to support the strengthening of the diagnosis. In radiology to support the diagnosis of Alzheimer's, usually using MRI to observe the hippocampus area. Alzheimer's disease will experience an abnormal condition in the hippocampus, which is a shrinkage according to the increase in the CDR (Critical Dementia Ratio) value in Alzheimer's sufferers [3]. With the rapid development of information technology, especially in digital image processing, the radiological image analysis process, which is usually manual, can use information technology, commonly known as Computer-Aided Diagnosis. The development of Computer-Aided Diagnosis itself has been very numerous, some of which are as follows. Taylor [4] evaluated the impact of computer-aided diagnosis, which is currently widely used, by asking a radiologist to perform a visual evaluation of medical images on the CADX system developed by them. Retter [5] developed and evaluated computer-aided diagnosis for breast cancer detection, including tissue movement in the breast, tissue segmentation, information extraction, and classification. Tiwari [6] has developed a Computer-Aided Diagnosis for the classification of brain tumors based on artificial neural networks. Cahan [7] has developed a Computer-Aided Diagnosis for the healthcare system that includes computerized diagnosis of various symptoms so that the system can provide some suggestions for the initial treatment of these symptoms. Zhu [8] has developed a Computer-Aided Diagnosis to classify pancreatic cancer tissue with normal tissue based on digital image processing. Chauhan [9] has developed a computer-aided diagnosis for tuberculosis based on texture extraction

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and segmentation of the chest area. Bajwa [10] has developed computer-aided diagnoses for skin diseases based on deep learning methods. Santiago [11] has developed computer-aided diagnoses for various types of scoliosis.

Our research has the ultimate goal of developing a computer-aided diagnosis to strengthen the diagnosis of Alzheimer's based on the severity of Alzheimer's according to the CDR scale [3] [12] [13] [14] [1] [15]. However, in this paper, we focus on developing a simple tool for calculating the coronal hippocampus slice volume to obtain a three-dimensional visualization of the hippocampus area.

METHODS

Data Acquisition

The physical data used in the experiment were MRI brain images obtained from OASIS (Open Access Series of Imaging Studies)[16][17][18][19][20]. Data is downloaded in a large capacity and a lot. The reading of the MRI data was performed on the MRIcro software. Then the software will convert the image into a new image file to be processed in MATLAB. Data clustering was carried out to make identification more accessible because the data contained in OASIS is still in random form, not yet structured. The grouping is done on the image is in the form of MRI images of the Alzheimer's brain with various ages, genders, and CDR levels.

System Design

After obtaining the data grouped as explained in the above sub-section, the next step is to do a system design. The stages of digital image processing that will be carried out include Brightness and Contrast Stretching. Then segmentation is done using the active contour method, then the image area is calculated. In order to identify the volume, each image that has been segmented and its area calculated will then be stored. So that in the final stage, the volume of the brain hippocampus MRI image will be identified. The design and program design will be tested and simulated with some data processed in the GUI (Guide User Interface) software that has been built. After showing the effectiveness, the GUI software will be applied to identify the volume of data on the MRI image of the Alzheimer's brain clustered based on age, gender, and CDR level. In this design, we used operating system Windows Seven Ultimate 64-bit, MRIcro, and Matlab R2013b

Three-Dimensional Reconstruction

In three-dimensional reconstruction, the most needed variable is the volume of the object to be reconstructed. In this experiment, the calculation of the volume of the coronal hippocampus slice was carried out after the area was localized. In this experiment, like our previous research [14] [21] [3] [13] [2] [12] [15] , we use active contour segmentation. Segmentation was carried out on all slices of the hippocampus to be reconstructed. In this experiment, the average number of slices per hippocampus is between 1-256 slices with an average thickness of 1 pixel. Volume calculation is done by adding up all the area of the slice in one intact hippocampus.

RESULTS AND DISCUSSIONS

In this experiment, the image used has a characteristic size of 208 x 176 pixels. A total of 416 MRI files of Alzheimer's brain consisting of CDR 0, CDR 1, CDR 2, and MRI images have not been identified. So that in this experiment, only 40 identified MRI images were used for system evaluation. The initial design of this research will use the direct MRI retrieval method by accessing files from the MRI images directly. However, we encountered problems accessing files with the extension ".hdr" into the MATLAB application. So we replaced this method with cutting images from each 2D MRI slice stored in the extension "*. Jpg, * .bmp, * .png. in this experiment, the image is stored with the extension "* .bmp. The 2D image accessing method is a reasonably efficient method because in the later stages of this experiment when the hippocampus image is separated from other images, it is still done manually by determining the hippocampus area's coordinates. The three-dimensional reconstruction program for the coronal hippocampus slice that has been designed is shown in Figure 1. In the created software, there are several stages, including insert image, contrast stretching, initial masking, active contour, calculate the volume and 3D visualization.

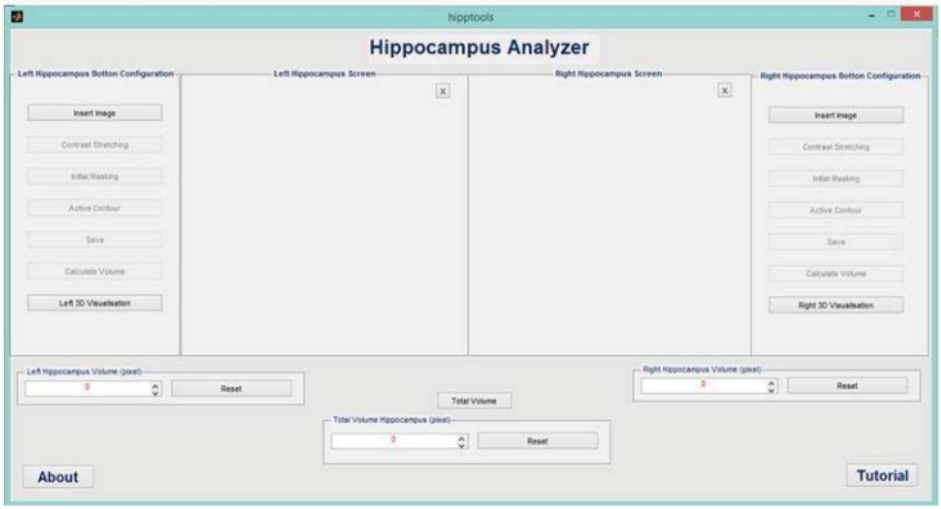

FIGURE 1. System home screen display

The stage of image retrieval is carried out sequentially from the first to the last slice. Each hippocampus coronal slice is stored in the same folder. This case is to make it easier to access the image that will be entered into the program. The function used to access the image is to use the *uigetfile* function, as shown in the source code below:

```
mainimage_lefthippo = 0;
axes(handles.viewer_left);
cla reset;

[filename,pathname] = uigetfile({
'*.bmp;*.jpg;*.png;*.tif;*.gif','file citra(*.bmp,*.jpg,*.tif,*.png,*.gif)';
'*.bmp','citra bitmap(*.bmp)';
'*.jpg','citra jpeg(*.jpg)';
'*.tif','citra tif(*.tif)';
'*.png','citra png(*.png)';
'*.gif','citra gif(*.gif)';
'*.*','semua file (*.*)'},...
'Buka Citra Hippocampus Kiri');

if ~isequal(filename,0)
    mainimage_lefthippo = imread(fullfile(pathname,filename));
    %visibles
    set(handles.viewer_left,'visible','on');
    axes(handles.viewer_left);
    imshow(mainimage_lefthippo);
else
    mainimage_lefthippo = 0;
    set(handles.viewer_left,'visible','off');
    return
end

handles.mainimage_lefthippo = mainimage_lefthippo;
```

When this function is executed, a search box for the image file's location will appear in the program. Image files that can be accessed by this function are only images with the extension ". * .Gif", "* .bmp", "* .tif", "* .png", and "* .gif". The program cannot execute files other than these extensions. Then the image file will be stored in a matrix which is then displayed in the viewer_left function. In the GUI, the process that occurs is as shown in Figure 2. The process of inserting an image is done by simply pressing the "Insert Image" push button on the GUI, then searching for the location of the image file we want to access. Then the image will be displayed on its GUI device.

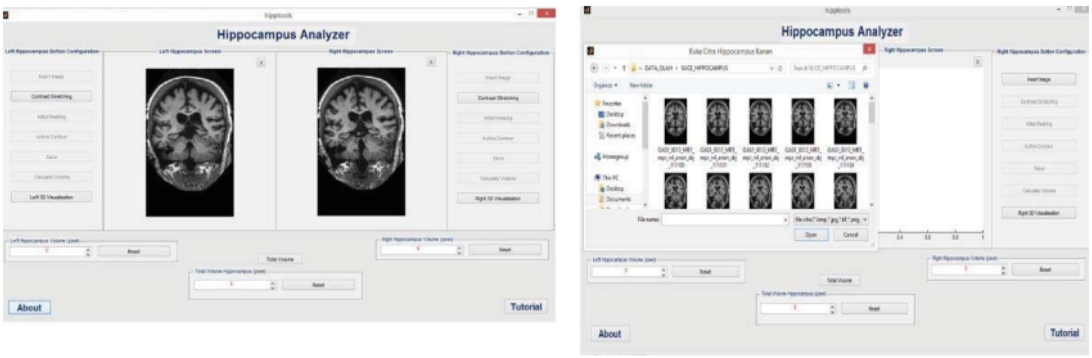

FIGURE 2. Display of Insert Image menu

The initial masking process in this experiment uses the *Roipoly* function in the MATLAB application. This function allows the user to perform MRI image segmentation interactively by following the contours of the hippocampus object, namely by creating dots around the hippocampus, where these points will ignore other areas around it. Figure 3 shows how the user creates contour points around the hippocampus to get the initial masking.

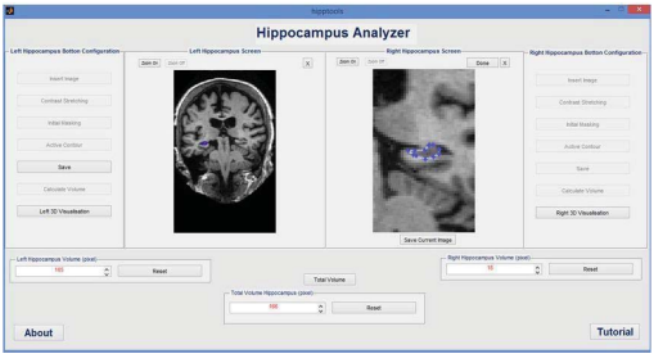

FIGURE 3. Initial masking process display

After the initial masking process is complete, the segmentation using the active contour method will be formed automatically by double-clicking the last point of the initial masking process. Figure 4 shows a menu display of the segmented hippocampus area.

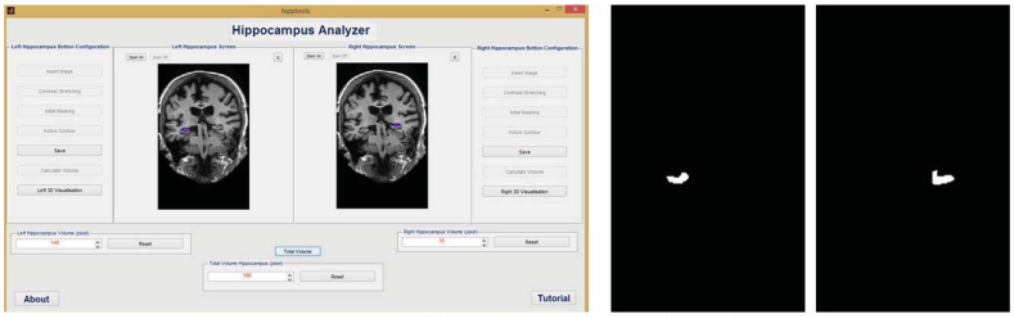

FIGURE 4. Display of the hippocampus segmentation result area

In calculating the volume of the hippocampus, the function used in the Matlab to do this addition is the sum function, with the details of sum (A, 1) the addition vertically and sum (A, 2) is the addition horizontally, and sum (A)

is the backward addition (z-axis). Using this algorithm to calculate the hippocampus volume for each coronal Alzheimer's MRI image is obtained. Figure 5 shows a view of the volume calculation and three-dimensional visualization.

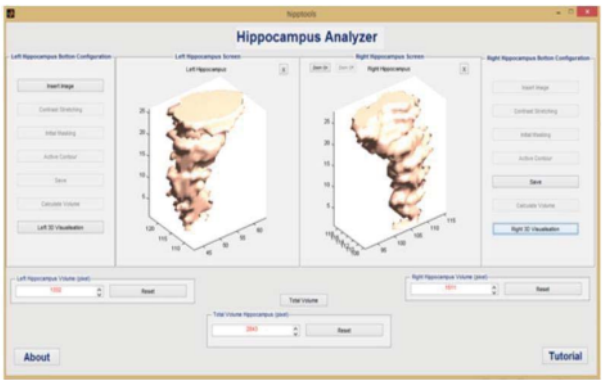

FIGURE 5. Display of volume calculation and 3D visualization

The results of implementing the MATLAB program made can be seen in the graph in Figure 6. The relationship between volume and CDR in the program's application shows that the average value for CDR 0 on the left hippocampus volume is 1973 pixels, the right-side hippocampus volume is 2055 pixels, and the total hippocampus volume is 4028 pixels. Then the average value for CDR 1 on the left hippocampus volume is 1252 pixels, the right hippocampus volume is 1253 pixels, and the total hippocampus volume is 2505 pixels. Meanwhile, the average value for CDR 2 on the left hippocampus volume is 731.5 pixels, the right hippocampus volume is 671 pixels, and the total hippocampus volume is 1402 pixels. It can be concluded that the volume of the left and right hippocampus of each hippocampus is not much different.

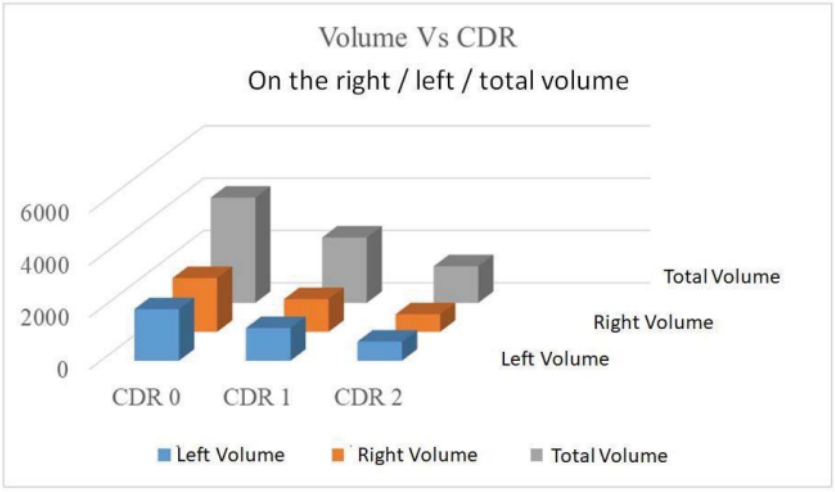

FIGURE 6. Graph of volume VS CDR

One of the performance measures in this tool developed with MATLAB is the execution time required to operate it. The relationship between CDR and operating time by the user results from the program's application showing that at CDR 0, the time used by the user is 74.1 minutes, then CDR 1 is 66.7 minutes, and CDR 2 is 53.5 minutes. This case shows that the lower the CDR value of an image, the longer it will calculate the volume. This case happens because the lower the CDR value, the greater the volume and the number of slices. Figure 7 shows this relationship.

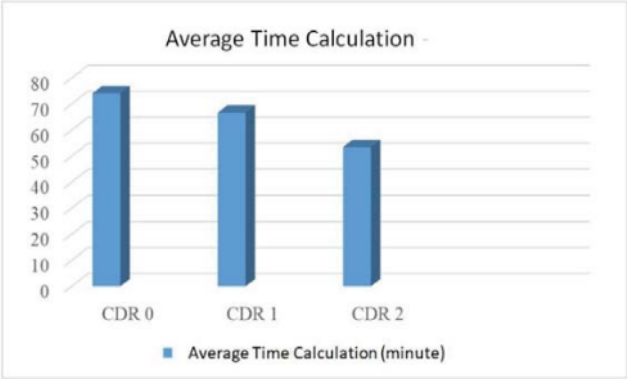

FIGURE 7. The graph of average time calculation

CONCLUSION

The design of a volume calculation and 3D visualization program using MATLAB, including the insert image stage, contrast stretching, initial masking, active contour, volume calculation, and 3D visualization, successfully calculates and visualizes coronal MRI image data the Alzheimer's hippocampus properly. This system could serve as a guideline for developing Computer-Aided Diagnosis for the next phase of Alzheimer's detection..

ACKNOWLEDGMENTS

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REFERENCES

1. R. Supriyanti, C. T. Arachman, Y. Ramadhani, and H. B. Widodo, "Hippocampal Area Calculation Based on the Clinical Dementia Rating Scale on Sagittal MRI Image Slice," *Technol. Reports Kansai Univ.*, vol. 62, no. 02, pp. 151–158, 2020.
2. R. Supriyanti, A. R. Subhi, E. J. Ashari, F. Ahmad, Y. Ramadhani, and H. B. Widodo, "Simple Classification of the Alzheimer's Severity in Supporting Strengthening the Diagnosis of Patients based on ROC Diagram," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 982, no. 1, 2020, doi: 10.1088/1757-899X/982/1/012007.
3. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "CORONAL SLICES SEGMENTATION OF MRI IMAGES USING ACTIVE CONTOUR METHOD ON INITIAL IDENTIFICATION OF ALZHEIMER SEVERITY LEVEL BASED ON CLINICAL DEMENTIA RATING (CDR)," *J. Eng. Sci. Technol.*, vol. 14, no. 3, pp. 1672–1686, 2019.
4. J. C. Taylor, C. Romanowski, E. Lorenz, C. Lo, O. Bandmann, and J. Fenner, "Computer-aided diagnosis for (123I)FP-CIT imaging: impact on clinical reporting," *EJNMMI Res.*, vol. 8, 2018, doi: 10.1186/s13550-018-0393-5.
5. F. Retter, C. Plant, B. Burgeth, G. Botella, T. Schlossbauer, and A. Meyer-Bäse, "Computer-aided diagnosis for diagnostically challenging breast lesions in DCE-MRI based on image registration and integration of morphologic and dynamic characteristics," *EURASIP J. Adv. Signal Process.*, vol. 2013, no. 1, pp. 1–10, 2013, doi: 10.1186/1687-6180-2013-157.
6. P. Tiwari, J. Sachdeva, C. K. Ahuja, and N. Khandelwal, "Computer aided diagnosis system-A decision support system for clinical diagnosis of brain tumours," *Int. J. Comput. Intell. Syst.*, vol. 10, no. 1, pp. 104–119, 2017, doi: 10.2991/ijcis.2017.10.1.8.
7. A. Cahan and J. J. Cimino, "A learning health care system using computer-aided diagnosis," *J. Med. Internet Res.*, vol. 19, no. 3, 2017, doi: 10.2196/jmir.6663.

8. M. Zhu *et al.*, "Differentiation of pancreatic cancer and chronic pancreatitis using computer-aided diagnosis of endoscopic ultrasound (EUS) images: A diagnostic test.," *PLoS One*, vol. 8, no. 5, 2013, doi: http://dx.doi.org/10.1371/journal.pone.0063820.
9. A. Chauhan, D. Chauhan, and C. Rout, "Role of gist and PHOG features in computer-aided diagnosis of tuberculosis without segmentation," *PLoS One*, vol. 9, no. 11, 2014, doi: 10.1371/journal.pone.0112980.
10. M. N. Bajwa *et al.*, "Computer-aided diagnosis of skin diseases using deep neural networks," *Appl. Sci.*, vol. 10, no. 7, pp. 1–14, 2020, doi: 10.3390/app10072488.
11. L. de Santiago *et al.*, "A computer-aided diagnosis of multiple sclerosis based on mfVEP recordings," *PLoS One*, vol. 14, no. 4, pp. 1–20, 2019, doi: 10.1371/journal.pone.0214662.
12. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "Calculating Ventricle's Area based on Clinical Dementia Rating (CDR) Values on Coronal MRI image," in *20th International Conference on Computer-Based Patient Records and Error Prevention (ICCPREP) 2018*, 2018.
13. R. Supriyanti, A. Fanthoni, E. J. Ashari, Y. Ramadhani, and H. B. Widodo, "Active Contour Method for Identifying Area of Sagittal and Axial Slices to Identify the Severity of Alzheimer's disease," in *International Conference on Recent Advances in Engineering and Technology (ICRAET)*, 2019.
14. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "A Simple Tool For Identifying The Severity of Alzheimer's Based on Hippocampal and Ventricular Size Using A ROC Curve on a Coronal Slice Image," *Asian J. Inf. Technol.*, vol. 17, no. 7, pp. 321–327, 2018.
15. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "Coronal slices segmentation of mri images using active contour method on initial identification of alzheimer severity level based on clinical dementia rating (CDR)," *J. Eng. Sci. Technol.*, vol. 14, no. 3, pp. 1672–1686, 2019.
16. J. Morris, "The Clinical Dementia Rating (CDR): current version and scoring rules.," *Neurology*, vol. 43, pp. 2412b-2414b, 1993.
17. R. Buckner *et al.*, "A unified approach for morphometric and functional data analysis in young, old, and demented adults using automated atlas-based head size normalization: reliability and validation against manual measurement of total intracranial volume.," *Neuroimage*, vol. 23, pp. 724–738, 2004, doi: 10.1016/j.neuroimage.2004.06.018.
18. E. Rubin *et al.*, "A prospective study of cognitive function and onset of dementia in cognitively healthy elders.," *Arch Neurol*, vol. 55, pp. 395–401, 1998.
19. Y. Zhang, M. Brady, and S. Smith, "Segmentation of brain MR images through a hidden Markov random field model and the expectation maximization algorithm," *IEEE Trans. Med. Imaging*, vol. 20, no. 1, pp. 45–57, 2001, doi: 10.1109/42.906424.
20. A. Fotenos, A. Snyder, L. Girton, J. Morris, and R. Buckner, "Normative estimates of cross-sectional and longitudinal brain volume decline in aging and AD," *Neurology*, vol. 64, pp. 1032–1039, 2005, doi: 10.1212/01.WNL.0000154530.72969.11.
21. R. Supriyanti, A. K. Marchel, Y. Ramadhani, and H. B. Widodo, "Coronal slice segmentation using a watershed method for early identification of people with Alzheimer's," *Telkomnika (Telecommunication Comput. Electron. Control.*, vol. 19, no. 1, pp. 63–72, 2020, doi: 10.12928/TELKOMNIKA.V19I1.15142.

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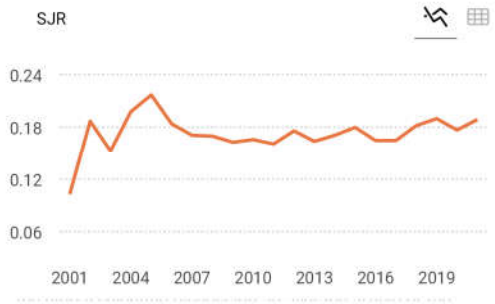

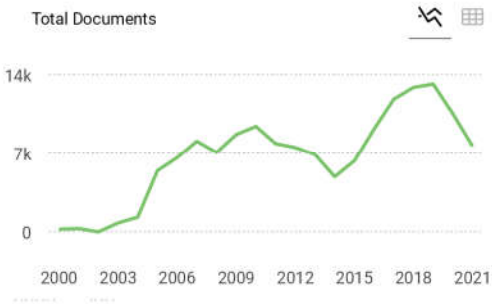

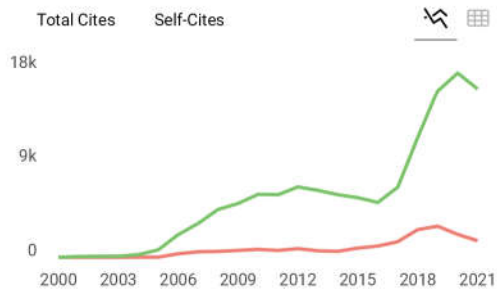

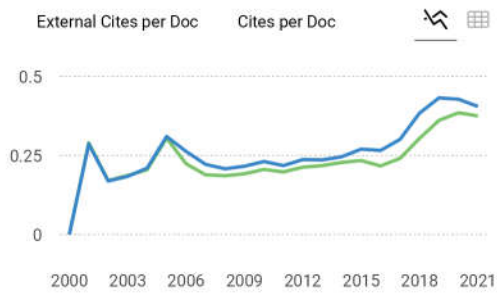

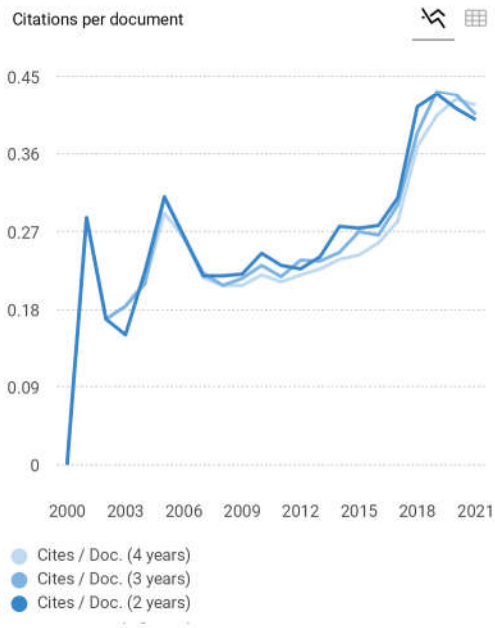

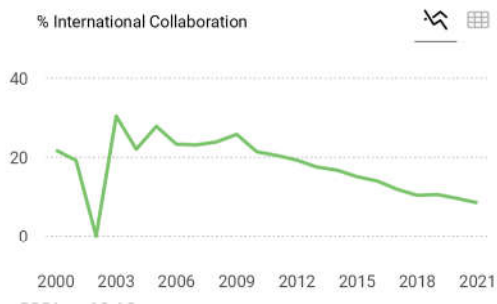

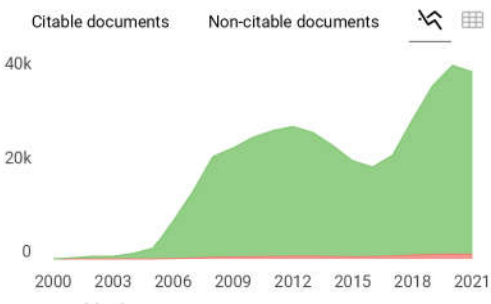

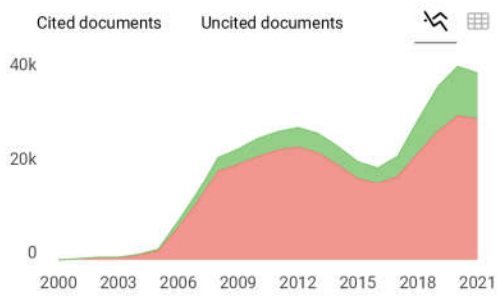

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Thank you very much

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Fathi,
Thank you for contacting us. Please see comments below.
Best Regards, SCImago Team

G **Ghazwan Jreou** 2 years ago

Dear sir
respects
would you please let me know in which Q is your journal (conferences and proceeding) classified? according to Scopus Q classification list .
with regards.

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Ghazwan,
Thank you for contacting us. We calculate the SJR data for all the publication's types, but the Quartile's data are only calculated for Journals and Book Series.
Best regards, SCImago Team

A **ASHOK KUMAR K** 2 years ago

As per the information in SJR portal the coverage period for AIP conference proceedings is up to 2020. I want to know whether the period of validity or coverage gets extended or not? If gets extended when can we see those updates in the SJR portal?

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Ashok,
Thank you very much for your comment.
All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2019 was released on 11 June 2020. Therefore, the indicators for 2020 will be available in June 2021.
We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day.
Best Regards, SCImago Team

K **Kay** 2 years ago

My university is going to organise a conference in social science on 27-28 Oct 2021. We would like to publish our conference papers in your proceeding as our official proceeding. What are the procedures and publication fees?

Regards.

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Kay,
thank you for contacting us.
We are sorry to tell you that SCImago Journal & Country Rank is not a publication. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.
Unfortunately, we cannot help you with your request, we suggest you visit the homepage or contact the editorial staff , so they could inform you more deeply.
Best Regards, SCImago Team

R **Ruslan** 2 years ago

I have published articles on AIP, but until now I have not received confirmation for my Scopus ID, please explain. thank you

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Ruslan,
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus support: https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/
Best Regards, SCImago Team

V **Vikas** 2 years ago

currently, the journal is not assigned quartile (Q indexing). When we can expect the assignment.

reply

SCImago Team

Melanie Ortiz 2 years ago

Dear Vikas,
Thank you for contacting us. We calculate the SJR data for all the publication's types, but the Quartile's data are only calculated for Journals and Book Series.
Best regards, SCImago Team

S **Siddik** 3 years ago

This will come under scopus journal list?

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Siddik,
Thank you very much for your comment.
All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2019 was updated on June 2020, 11. We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day.
Best Regards, SCImago Team

H **Hassan Yassein** 3 years ago

ISSN of this journal different of ISSN in Scopus, although the data of
SJR depends on the scopes

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Hassan,
Thank you for contacting us.
SJR is a portal with scientometric indicators of journals indexed in Scopus. All the data (Title, ISSN, etc.) have been provided by Scopus /Elsevier and SCImago doesn´t have the authority over this data which are property of Scopus/Elsevier. SCImago has a signed agreement that limits our performance to the generation of scientometric indicators derived from the metadata sent in the last update (April/May 2020).

The next SCImago update will be made throughout June 2020 with the new update sent by Scopus. We suggest you wait for that date in order to see if there are any changes regarding this matter.

Best Regards, SCImago Team

Khairil 3 years ago

Is this proceeding ranked Q4?

reply

A **ali mohammed** 3 years ago

why this journal dont have any rank yet ?
it is dont belong to Q1,2,3,4 ?

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Ali,
Thank you for contacting us. We calculate the SJR data for all the publication types, but

the Quartile data are only calculated for Journal type's publications. Best regards,
SCImago Team

A **Akshya Sekar** 3 years ago

Hi mam/sir,
I want to know whether this AIP conference proceeding is indexed in SCI or not?

Thanks

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Akshya,
Thank you for contacting us. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus. Unfortunately, we cannot help you with your request referring the index status. We suggest you to consult Scopus database (see the current status of the journal) or other databases (like WoS). Best Regards, SCImago Team

Khairil 3 years ago

Your IP (036.071.233.236) is blocked.
Block Reason: This IP was identified as infiltrated and is being used by sci-hub as a proxy.

How to unblock this my IP for acess AIP site?

thanks

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Khairil,
thank you for contacting us.
Sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.
Unfortunately, we cannot help you with your request, we suggest you to contact the journal's editorial staff by e-mail. Best Regards, SCImago Team

D **Duha Ahmed** 3 years ago

dear Admin
about the AIP Conference Proceeding can you see the Scopus site because the date end to 2019 is there any update about this time or change it to 2020 in the near future and you will see it in the site of Scopus
https://www.scopus.com/sourceid/26916

I hope the AIP Conference Proceeding is still in the Scopus for 2020
with my best wishes
Miss Duha

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Duha,

Thank you for contacting us.Unfortunately, we cannot see what will happen in the future with this journal. Best Regards, SCImago Team

M **mohammed** 3 years ago

Is the (AIP Conference Proceeding) out of Scopes because I tried to search for it in Scopes and I did not find it
Please answer me

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Mohammed,

thank you for contacting us. You can find it in Scopus: https://www.scopus.com/sourceid/26916

Best Regards, SCImago Team

T **Thanh Quang Khai Lam** 3 years ago

Dear Elena Corera!
Can you tell me "Lecture notes in civil engineering" in Q4?
i don't see in Scimago.
Thank you

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Thanh,
Thank you for contacting us. We calculate the SJR data for all the publication types, but the Quartile data are only calculated for Journal type's publications. Best regards, SCImago Team

T **Teo Jin Chuan** 3 years ago

Dear Admin,

Can i know is this journal Q1,Q2,Q3 or Q4. Thank you.

Regards

reply

SCImago Team

Melanie Ortiz 3 years ago

Dear Teo, thank you very much for your request. You can consult that information in SJR website. Best Regards, SCImago Team

H **Hassan Abdulhadi** 4 years ago

I ASKE ABOUT AIP CONFERENCE PROCEEDINGS WITHIN SCOPUS OR THOMSON REUTERS WITH BEST WISHES

reply

H **Hassan Abdulhadi** 4 years ago

I ASKE ABOUT AIP CONFERENCE PROCEEDINGS WITHIN SCOPUS OR THOMSON REUTERS WITH BEST WISHES

SCImago Team

Elena Corera 4 years ago

Dear Hassan,

thank you for your request, all the journals included in SJR are indexed in Scopus. Elsevier / Scopus is our data provider.

Best Regards,
SCImago Team

T **Tarik** 4 years ago

Dear. Elena
Hi

Please can we concedar AIP conference proceeding as journal .What i mean ,the publication type could be
journal of AIP conference proceedings .

Best regards

TArik AlOmran

reply

SCImago Team

Elena Corera 4 years ago

Dear Tarik,

thank you very much for your comment. Unfortunately, we cannot help you with your request, we suggest you contact journal's editorial staff so they could inform you more deeply. You can find contact information in SJR website https://www.scimagojr.com

Best regards,
SCImago Team

D **Dunia** 4 years ago

dear
did the AIP conference (TMREES 18)have Thomson roeters or scopus or SJR Rank or not?

reply

SCImago Team

Elena Corera 4 years ago

Dear Dunia,

thank you very much for your comment. SCImago Journal & Country Ranks shows all the journal's vailable information in Open Access If you do not locate the journal in the search engine, Scopus / Elsevier has not provided us those data.

Best Regards,
SCImago Tea

B **Budi Adiperdana** 5 years ago

Dear Admin,

Could you please add the Quartile Rank for AIP Conference Proceedings

Best regards,
Budi

reply

SCImago Team

Elena Corera 5 years ago

Dear Budi, for Conferences and Proceedings the SJR is not calculated. Best Regards,
SCImago Team

Leave a comment

Name

Email
(will not be published)

Submit

The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

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PRELIMINARY

No Access . February 2023

Preface: The 3rd International Conference on Engineering, Technology and Innovative Researches

more...

AIP Conference Proceedings **2482**, 010001 (2023);
https://doi.org/10.1063/12.0012495

ARTIFICIAL INTELLIGENCE

No Access . February 2023

Machine learning for sugarcane mapping based on segmentation in cloud platform

Sudianto, Yeni Herdiyeni and Lilik Budi Prasetyo

AIP Conference Proceedings **2482**, 020001 (2023); https://doi.org/10.1063/5.0132180

SHOW ABSTRACT

No Access . February 2023

Decision tree using ant colony for classification of health data

Arief Kelik Nugroho, Ipung Permadi, Yogiek Indra Kurniawan, Aini Hanifa and Nofiyati

AIP Conference Proceedings **2482**, 020002 (2023); https://doi.org/10.1063/5.0128787

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No Access . February 2023

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Real time monitoring and identification of electrical load based on artificial neural network

Muhammad Syukri, Yusran, Yusri Syam Akil and Muhammad Ruswandi Djalal

AIP Conference Proceedings **2482**, 020003 (2023); https://doi.org/10.1063/5.0111803

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No Access . February 2023

Optimum trajectory of multi-UAV for fertilization of paddy fields using ant colony optimization (ACO) and 2-opt algorithms

Michael Julyus Christopher Manullang, Karlisa Priandana and Medria Kusuma Dewi Hardhienata

AIP Conference Proceedings **2482**, 020004 (2023); https://doi.org/10.1063/5.0110697

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No Access . February 2023

Liveness detection with image

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2541 (2022)
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quality assessment

Muhammad Ghifari Zuhir, Retno Supriyanti and Anto Satriyo Nugroho

AIP Conference Proceedings **2482**, 020005 (2023); https://doi.org/10.1063/5.0113428

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No Access . February 2023

Face recognition with anti spoofing eye blink detection

Syafrudin Rais Akhdan, Retno Supriyanti and Anto Satriyo Nugroho

AIP Conference Proceedings **2482**, 020006 (2023); https://doi.org/10.1063/5.0113512

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No Access . February 2023

Optimizer analysis on efficient-net architecture for Alzheimer's classification based on magnetic resonance imaging (MRI)

Yuanda F. Pranata, Rita Magdalena and Nor Kumalasari Caecar Pratiwi

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2481 (2022)
2394 (2022)
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AIP Conference Proceedings **2482**, 020007 (2023); https://doi.org/10.1063/5.0123261

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No Access . February 2023

Bima script handwriting pattern recognition using histogram of oriented gradients and backpropagation classification method

Mustiari, Fitri Bimantoro, Gibran Satya Nugraha and Ario Yudo Husodo

AIP Conference Proceedings **2482**, 020008 (2023); https://doi.org/10.1063/5.0111795

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No Access . February 2023

Recognition of Bima script handwriting patterns using the local binary pattern feature extraction method and K-nearest neighbour

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2503 (2022)
8 (2022)

classification method

Muhammad Ilham Fidatama, Fitri Bimantoro, Gibran Satya Nugraha, Budi Irmawati and Ramaditia Dwiyansaputra

AIP Conference Proceedings **2482**, 020009 (2023); https://doi.org/10.1063/5.0111770

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No Access . February 2023

Bima script handwriting pattern recognition with gray level co-occurrence matrix feature extraction and zoning & classification of probabilistic neural networks

Muhammad Naufal, Fitri Bimantoro, Arik Aranta and I. Gede Pasek Suta Wijaya

AIP Conference Proceedings **2482**, 020010 (2023); https://doi.org/10.1063/5.0111802

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COMPUTER ENGINEERING

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2573 (2022)
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No Access . February 2023

Validating an analytical method to predict flexural behavior of RC T-beams retrofitted with bonded steel wire ropes in the negative moment region

Yanuar Haryanto, Fu-Pei Hsiao, Hsuan-Teh Hu, Ay Lie Han, Banu Ardi Hidayat and Laurencius Nugroho

AIP Conference Proceedings **2482**, 030001 (2023); https://doi.org/10.1063/5.0113554

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No Access . February 2023

Comparison of tuberculosis disease classification using support vector machine and Naive Bayes algorithm

Yogiek Indra Kurniawan, Aini Hanifa, Lasmedi Afuan, Ari Fadli and Muhammad Syaiful Aliim

AIP Conference Proceedings **2482**, 030002 (2023); https://doi.org/10.1063/5.0110987

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No Access . February 2023

Design a simple Covid-19 detection using corodet: A deep learning-based classification

Muhammad Syaiful Aliim, Ari Fadli, Yogi Ramadhani, Yogiek Indra Kurniawan and Widhiatmoko Herry Purnomo

AIP Conference Proceedings **2482**, 030003 (2023); https://doi.org/10.1063/5.0110764

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No Access . February 2023

Development of automatic rice plant pest detection system based on convolutional neural network

Matthew Sjarah, Winda Astuti, Lie Zener and Ari Fadli

AIP Conference Proceedings **2482**, 030004 (2023); https://doi.org/10.1063/5.0110445

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No Access . February 2023

Implementation analysis for automatic visitor counter system using mobile microcontroller Arduino Uno

Intan Adila Kautsar, Siti Alvi Solikhatin, Afif Andi Nur Agazi and Imam Tahyudin

AIP Conference Proceedings **2482**, 030005 (2023); https://doi.org/10.1063/5.0111440

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No Access . February 2023

Comparison of throughput and CPU usage between WPA3 and WPA2 security methods on wireless networks 802.11n

Dedy Cahyadi, Indah Fitri Astuti and Nazaruddin

AIP Conference Proceedings **2482**, 030006 (2023); https://doi.org/10.1063/5.0110514

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No Access . February 2023

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(2022)

Compressive sensing on transform domain-based medical images watermarking

Alvia Widyani, Ledya Novamizanti and Sofia Saidah

AIP Conference Proceedings **2482**, 030007 (2023); https://doi.org/10.1063/5.0110461

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COMPUTER SCIENCE

No Access . February 2023

The development of autonomous drone for document delivery in IPB University

Carli Apriansyah Hutagalung, Karlisa Priandana and Kudang Boro Seminar

AIP Conference Proceedings **2482**, 040001 (2023); https://doi.org/10.1063/5.0110699

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No Access . February 2023

Design and implementation of automatic solar water pumps for irrigation

Sarah Maharani, Bandiyah Sri Aprillia, Porman Pangaribuan and Ananda Ayu Aulia

AIP Conference Proceedings **2482**, 040002 (2023); https://doi.org/10.1063/5.0113884

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No Access . February 2023

Monitoring and controlling earthworm cultivation site based on internet of things

Mas Aly Afandi, Rizkya Reza and Rahmat Widadi

AIP Conference Proceedings **2482**, 040003 (2023); https://doi.org/10.1063/5.0110930

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CIVIL ENGINEERING

No Access . February 2023

The effect of coca cola

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(2021)

additive as admixtures on concrete

Tamrin, Mardewi Jamal, Juli Nurdiana and Amirul Mirza Ghulam

AIP Conference Proceedings **2482**, 050001 (2023); https://doi.org/10.1063/5.0115802

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No Access . February 2023

Seawater-mixed concrete in Indonesia and anti-corrosive materials: A review

Sabrina Harahap, Surya Dewi Puspitasari and Ahmad Aki Muhaimin

AIP Conference Proceedings **2482**, 050002 (2023); https://doi.org/10.1063/5.0110946

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No Access . February 2023

Embodied energy consumption in flexible pavement materials: A case study in Yogyakarta, Indonesia

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Subrata Aditama Kittie Aidon Uda, Rudi Waluyo, Waluyo Nuswantoro, Veronika Happy Puspasari and Apria Brita Pandohop Gawei

AIP Conference Proceedings **2482**, 050003 (2023); https://doi.org/10.1063/5.0111156

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No Access . February 2023

Residual strength of normal concrete reinforced with aluminum fiber at elevated temperatures

Laurencius Nugroho, Fu-Pei Hsiao, Hsuan-Teh Hu, Ay Lie Han, Yanuar Haryanto, Gathot Heri Sudibyo and Banu Ardi Hidayat

AIP Conference Proceedings **2482**, 050004 (2023); https://doi.org/10.1063/5.0110869

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Soil improvement using geotextiles non-woven with a case history: Road construction in oilfield area

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Nina Purwanti, Firman Priatna, Pungky Dharma Saputra, Anasya Arsita Laksmi and Muhammad Hamzah Fansuri

AIP Conference Proceedings **2482**, 050005 (2023); https://doi.org/10.1063/5.0116170

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No Access . February 2023

The effect of spatial scales and imbalanced data treatment on the landslide susceptibility mapping using Random Forest

Yanto, Mahmud Iwan Solihin and Gito Sugiyanto

AIP Conference Proceedings **2482**, 050006 (2023); https://doi.org/10.1063/5.0111326

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No Access . February 2023

Bridge inspection implementations and maintenance planning – A comparative analysis of a few distinctive countries

Surya Dewi Puspitasari, Sabrina Harahap and Ika Rahmawati S

AIP Conference Proceedings **2482**, 050007 (2023); https://doi.org/10.1063/5.0110943

SHOW ABSTRACT

No Access . February 2023

Flexural behavior of artificial lightweight aggregate concrete reinforced by carpet waste fiber

Banu Ardi Hidayat, Hsuan-Teh Hu, Fu-Pei Hsiao, Ay Lie Han, Yanuar Haryanto and Laurencius Nugroho

AIP Conference Proceedings **2482**, 050008 (2023); https://doi.org/10.1063/5.0110752

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No Access . February 2023

The study of building inspection reliability and life cycle cost analysis in Universitas Sebelas Maret Surakarta

Paramitha Mega Putri, Stefanus Adi Kristiawan and

Niken Silmi Surjandari

AIP Conference Proceedings **2482**, 050009 (2023); https://doi.org/10.1063/5.0132011

SHOW ABSTRACT

No Access . February 2023

Corrosion rate of deteriorated steel bar protected by sacrificial anode cathodic protection

Pinta Astuti, Rahmita Sari Rafdinal, Daisuke Yamamoto and Hidenori Hamada

AIP Conference Proceedings **2482**, 050010 (2023); https://doi.org/10.1063/5.0110419

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No Access . February 2023

A novel proposed method for strengthening RC beams using FRP string and geopolymer

Gathot Heri Sudibyo, Sri Tudjono and Ilham Nur Huda

AIP Conference Proceedings **2482**, 050011 (2023);

2330 (2021)
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(2020)

https://doi.org/10.1063/5.0112892

SHOW ABSTRACT

No Access . February 2023

The effect of different acceleration corrosion processes on flexural strength of oil palm shell concrete

Hesti Rahayu, Ahmad Zaki, Fadillawaty Saleh and Amir Fauzi

AIP Conference Proceedings **2482**, 050012 (2023); https://doi.org/10.1063/5.0110423

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No Access . February 2023

Control of turnaround maintenance project to control time performance of the project

Nendra Gunawan, Leni Sagita Riantini and Rossy Armyn Machfudianto

AIP Conference Proceedings **2482**, 050013 (2023); https://doi.org/10.1063/5.0133137

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2309 (2020)
(2020)

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No Access . February 2023

Noise level prediction model on toll roads in Makassar City

Nadiyah Widaryanti, Muralia Hustim and Sumarni Hamid

AIP Conference Proceedings **2482**, 050014 (2023); https://doi.org/10.1063/5.0113580

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No Access . February 2023

Aircraft routes of domestic cargo transport based on the Indonesian National Logistics System

Gito Sugiyanto, Purwanto Bekti Santoso, Aris Wibowo and Mina Yumei Santi

AIP Conference Proceedings **2482**, 050015 (2023); https://doi.org/10.1063/5.0110640

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No Access . February 2023

Land use planning and its impact on movement pattern in Purbalingga City

Probo Hardini, Eva Wahyu Indriyati and Giskha Hidayanti

AIP Conference Proceedings **2482**, 050016 (2023); https://doi.org/10.1063/5.0110715

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No Access . February 2023

The role of recycling waste powder as a sustainable concrete manufacturing material

Ni Nyoman Kencanawati, Miko Eniarti and Dedi A Alfarizi

AIP Conference Proceedings **2482**, 050017 (2023); https://doi.org/10.1063/5.0112490

SHOW ABSTRACT

No Access . February 2023

Impact of water and soil quality on the degradation of concrete strength in the Vietnamese Mekong Delta, Vietnam

Huynh Vuong Thu Minh, Tran Van Ty, Nguyen Ngoc Long Giang, Nguyen Van Tho, Trinh Cong Luan and Le Hai Tri

AIP Conference Proceedings **2482**, 050018 (2023); https://doi.org/10.1063/5.0134033

SHOW ABSTRACT

No Access . February 2023

The effect of novel coronavirus disease (COVID-19) on air transport

Gito Sugiyanto, Purwanto Bekti Santoso and Mina Yumei Santi

AIP Conference Proceedings **2482**, 050019 (2023); https://doi.org/10.1063/5.0110645

SHOW ABSTRACT

2254 (2020)
2268 (2020)
2263 (2020)
2259 (2020)
2257 (2020)
2256 (2020)
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2248 (2020)
2247 (2020)
(2020)

No Access . February 2023

Seismic retrofitting of existing steel structures with X-bracing

Sri Wanto, Senot Sangadji and Halwan Alfisa Saifullah

AIP Conference Proceedings **2482**, 050020 (2023); https://doi.org/10.1063/5.0112776

SHOW ABSTRACT

ELECTRONICS

No Access . February 2023

An IoT-based home appliances ecosystem to improve energy use efficiency

Azis Wisnu Widhi Nugraha, Ari Fadli and Winasis

AIP Conference Proceedings **2482**, 060001 (2023); https://doi.org/10.1063/5.0112730

SHOW ABSTRACT

ELECTRICAL POWER

2244 (2020)
2241 (2020)
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2237 (2020)
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(2020)

No Access . February 2023

Oil palm mapping based on machine learning and non-machine learning approach using Sentinel-2 imagery

Muhamad Khairul Rosyidy, Adi Wibowo and Iqbal Putut Ash Sidiq

AIP Conference Proceedings **2482**, 070001 (2023); https://doi.org/10.1063/5.0114333

SHOW ABSTRACT

No Access . February 2023

Characteristics of DC current component injection in grid tied H-bridge CSI with transformer

Suroso and Hari Siswantoro

AIP Conference Proceedings **2482**, 070002 (2023); https://doi.org/10.1063/5.0110672

SHOW ABSTRACT

No Access . February 2023

Characteristics of overlap-

2232 (2020)
2231 (2020)
2229 (2020)
2228 (2020)
2226 (2020)
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2213 (2020)
2209 (2020)
2218 (2020)
(2020)

time effect in a carrier based SPWM three-phase common-emitter CSI

Suroso

AIP Conference Proceedings **2482**, 070003 (2023); https://doi.org/10.1063/5.0110675

SHOW ABSTRACT

No Access . February 2023

Working time coordination of over current relay (OCR) and ground fault relay (GFR) in 20 kV feeder distribution

Hari Prasetijo, Ari Fadli, Widhiatmoko Herry Purnomo and Priswanto

AIP Conference Proceedings **2482**, 070004 (2023); https://doi.org/10.1063/5.0113957

SHOW ABSTRACT

No Access . February 2023

Optimal microgrid design and operation for sustainable shrimp farming

Nguyen Nhut Tien, Vo Tran Thi Bich Chau and Pham Van Hoan

AIP Conference Proceedings **2482**, 070005 (2023); https://doi.org/10.1063/5.0110433

SHOW ABSTRACT

No Access . February 2023

Application of modular multilevel converter for a grid-connected photovoltaic system

Ngoc-Thinh Quach, Minh-Trung Dao, Thai-Son Nguyen and Viet-Thong Ho

AIP Conference Proceedings **2482**, 070006 (2023); https://doi.org/10.1063/5.0110767

SHOW ABSTRACT

GEOLOGICAL ENGINEERING

No Access . February 2023

Karst landscapes in Indonesia: Potential disaster and mitigation

2195 (2019)
2191 (2019)
2188 (2019)
2196 (2019)
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2179 (2019)
2178 (2019)
(2019)

Akhmad Zamroni, Paramitha Tedja Trisnaning and Fajar Rizki Widiatmoko

AIP Conference Proceedings **2482**, 080001 (2023); https://doi.org/10.1063/5.0110500

SHOW ABSTRACT

No Access . February 2023

Paleocurrents and paleogeography of the Kalibiuk, Kaliglagah, Mengger, and Gintung Formation, Bumiayu - Tonjong, Central Java

Akhmad Khahlil Gibran, Dimas Rizki Ananda, Rachmad Setijadi, Muhammad Ilham Nabil and Eko Bayu Purwasatriya

AIP Conference Proceedings **2482**, 080002 (2023); https://doi.org/10.1063/5.0110410

SHOW ABSTRACT

1 2 3 ›

2181 (2019)

2176 (2019)

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Retno Supriyanti, Eko Wahyudi and Yogi Ramadhani

Simple Tool for Three-Dimensional Reconstruction of Coronal Hippocampus Slice Using Matlab

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Abstract. Information technology is developing very fast nowadays. In the medical field, one of which is the development of computer-aided diagnosis to strengthen the diagnosis. This paper will discuss the development of simple tools in measuring the volume of the coronal hippocampus slice due to MRI images. Based on this volume measurement, it will be used as the basis for the three-dimensional reconstruction of the hippocampus area. We emphasized 2-D analysis on the three slices of MRI images, both axial, sagittal, and coronal, in previous research. However, previous research results recommend that 3-D analysis will provide more information about the structure of the hippocampus and ventricles. Three-dimensional reconstruction is needed to add variables to measure the symptoms of Alzheimer's disease that we have done in previous studies. In this paper, we only discuss the three-dimensional analysis of the coronal slice. The results obtained indicate that the development of this simple Matlab-based tool can be used as a guideline for developing a better computer-aided diagnosis.

INTRODUCTION

Alzheimer's disease is a disease that affects many elderly patients, where the number is increasing every year.[1][2]. This condition is in contrast to the number of existing health services in developing countries such as Indonesia. This case happens because Alzheimer's is not a disease that has fatal consequences such as cancer, heart disease, kidney disease, etc. Alzheimer's diagnosis is carried out in several stages, one of which is the radiological examination to support the strengthening of the diagnosis. In radiology to support the diagnosis of Alzheimer's, usually using MRI to observe the hippocampus area. Alzheimer's disease will experience an abnormal condition in the hippocampus, which is a shrinkage according to the increase in the CDR (Critical Dementia Ratio) value in Alzheimer's sufferers [3]. With the rapid development of information technology, especially in digital image processing, the radiological image analysis process, which is usually manual, can use information technology, commonly known as Computer-Aided Diagnosis. The development of Computer-Aided Diagnosis itself has been very numerous, some of which are as follows. Taylor [4] evaluated the impact of computer-aided diagnosis, which is currently widely used, by asking a radiologist to perform a visual evaluation of medical images on the CADX system developed by them. Retter [5] developed and evaluated computer-aided diagnosis for breast cancer detection, including tissue movement in the breast, tissue segmentation, information extraction, and classification. Tiwari [6] has developed a Computer-Aided Diagnosis for the classification of brain tumors based on artificial neural networks. Cahan [7] has developed a Computer-Aided Diagnosis for the healthcare system that includes computerized diagnosis of various symptoms so that the system can provide some suggestions for the initial treatment of these symptoms. Zhu [8] has developed a Computer-Aided Diagnosis to classify pancreatic cancer tissue with normal tissue based on digital image processing. Chauhan [9] has developed a computer-aided diagnosis for tuberculosis based on texture extraction

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and segmentation of the chest area. Bajwa [10] has developed computer-aided diagnoses for skin diseases based on deep learning methods. Santiago [11] has developed computer-aided diagnoses for various types of scoliosis.

Our research has the ultimate goal of developing a computer-aided diagnosis to strengthen the diagnosis of Alzheimer's based on the severity of Alzheimer's according to the CDR scale [3] [12] [13] [14] [1] [15]. However, in this paper, we focus on developing a simple tool for calculating the coronal hippocampus slice volume to obtain a three-dimensional visualization of the hippocampus area.

METHODS

Data Acquisition

The physical data used in the experiment were MRI brain images obtained from OASIS (Open Access Series of Imaging Studies)[16][17][18][19][20]. Data is downloaded in a large capacity and a lot. The reading of the MRI data was performed on the MRIcro software. Then the software will convert the image into a new image file to be processed in MATLAB. Data clustering was carried out to make identification more accessible because the data contained in OASIS is still in random form, not yet structured. The grouping is done on the image is in the form of MRI images of the Alzheimer's brain with various ages, genders, and CDR levels.

System Design

After obtaining the data grouped as explained in the above sub-section, the next step is to do a system design. The stages of digital image processing that will be carried out include Brightness and Contrast Stretching. Then segmentation is done using the active contour method, then the image area is calculated. In order to identify the volume, each image that has been segmented and its area calculated will then be stored. So that in the final stage, the volume of the brain hippocampus MRI image will be identified. The design and program design will be tested and simulated with some data processed in the GUI (Guide User Interface) software that has been built. After showing the effectiveness, the GUI software will be applied to identify the volume of data on the MRI image of the Alzheimer's brain clustered based on age, gender, and CDR level. In this design, we used operating system Windows Seven Ultimate 64-bit, MRIcro, and Matlab R2013b

Three-Dimensional Reconstruction

In three-dimensional reconstruction, the most needed variable is the volume of the object to be reconstructed. In this experiment, the calculation of the volume of the coronal hippocampus slice was carried out after the area was localized. In this experiment, like our previous research [14] [21] [3] [13] [2] [12] [15] , we use active contour segmentation. Segmentation was carried out on all slices of the hippocampus to be reconstructed. In this experiment, the average number of slices per hippocampus is between 1-256 slices with an average thickness of 1 pixel. Volume calculation is done by adding up all the area of the slice in one intact hippocampus.

RESULTS AND DISCUSSIONS

In this experiment, the image used has a characteristic size of 208 x 176 pixels. A total of 416 MRI files of Alzheimer's brain consisting of CDR 0, CDR 1, CDR 2, and MRI images have not been identified. So that in this experiment, only 40 identified MRI images were used for system evaluation. The initial design of this research will use the direct MRI retrieval method by accessing files from the MRI images directly. However, we encountered problems accessing files with the extension ".hdr" into the MATLAB application. So we replaced this method with cutting images from each 2D MRI slice stored in the extension "*. Jpg, * .bmp, * .png. in this experiment, the image is stored with the extension "* .bmp. The 2D image accessing method is a reasonably efficient method because in the later stages of this experiment when the hippocampus image is separated from other images, it is still done manually by determining the hippocampus area's coordinates. The three-dimensional reconstruction program for the coronal hippocampus slice that has been designed is shown in Figure 1. In the created software, there are several stages, including insert image, contrast stretching, initial masking, active contour, calculate the volume and 3D visualization.

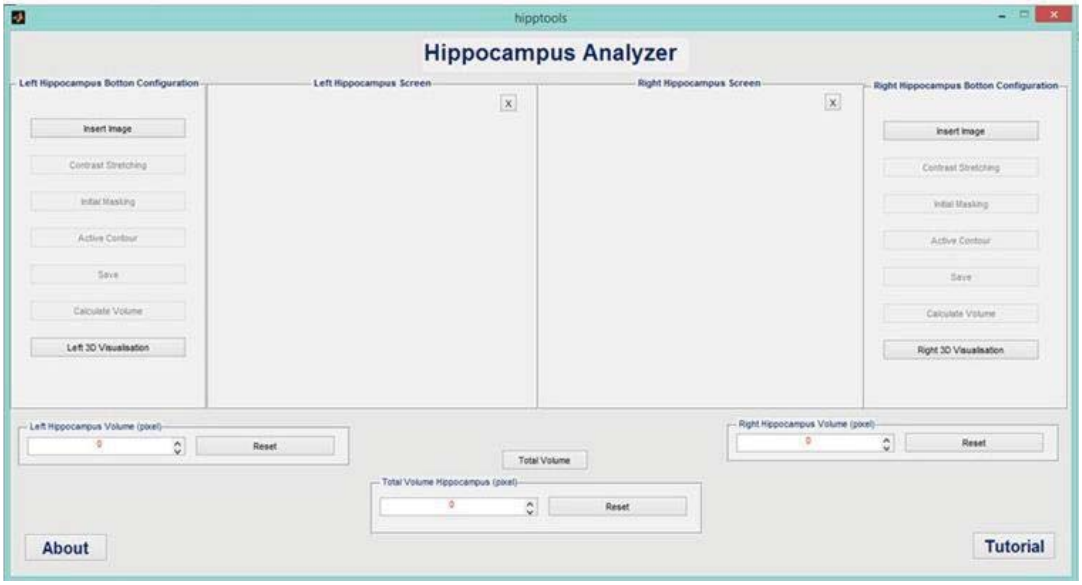

FIGURE 1. System home screen display

The stage of image retrieval is carried out sequentially from the first to the last slice. Each hippocampus coronal slice is stored in the same folder. This case is to make it easier to access the image that will be entered into the program. The function used to access the image is to use the *uigetfile* function, as shown in the source code below:

```
mainimage_lefthippo = 0;
axes(handles.viewer_left);
cla reset;

[filename,pathname] = uigetfile({
'*.bmp;*.jpg;*.png;*.tif;*.gif','file citra(*.bmp,*.jpg,*.tif,*.png,*.gif)';
'*.bmp','citra bitmap(*.bmp)';
'*.jpg','citra jpeg(*.jpg)';
'*.tif','citra tif(*.tif)';
'*.png','citra png(*.png)';
'*.gif','citra gif(*.gif)';
'*.*','semua file (*.*)'},...
'Buka Citra Hippocampus Kiri');

if ~isequal(filename,0)
    mainimage_lefthippo = imread(fullfile(pathname,filename));
    %visibles
    set(handles.viewer_left,'visible','on');
    axes(handles.viewer_left);
    imshow(mainimage_lefthippo);
else
    mainimage_lefthippo = 0;
    set(handles.viewer_left,'visible','off');
    return
end

handles.mainimage_lefthippo = mainimage_lefthippo;
```

When this function is executed, a search box for the image file's location will appear in the program. Image files that can be accessed by this function are only images with the extension ". * .Gif", "* .bmp", "* .tif", "* .png", and "* .gif". The program cannot execute files other than these extensions. Then the image file will be stored in a matrix which is then displayed in the viewer_left function. In the GUI, the process that occurs is as shown in Figure 2. The process of inserting an image is done by simply pressing the "Insert Image" push button on the GUI, then searching for the location of the image file we want to access. Then the image will be displayed on its GUI device.

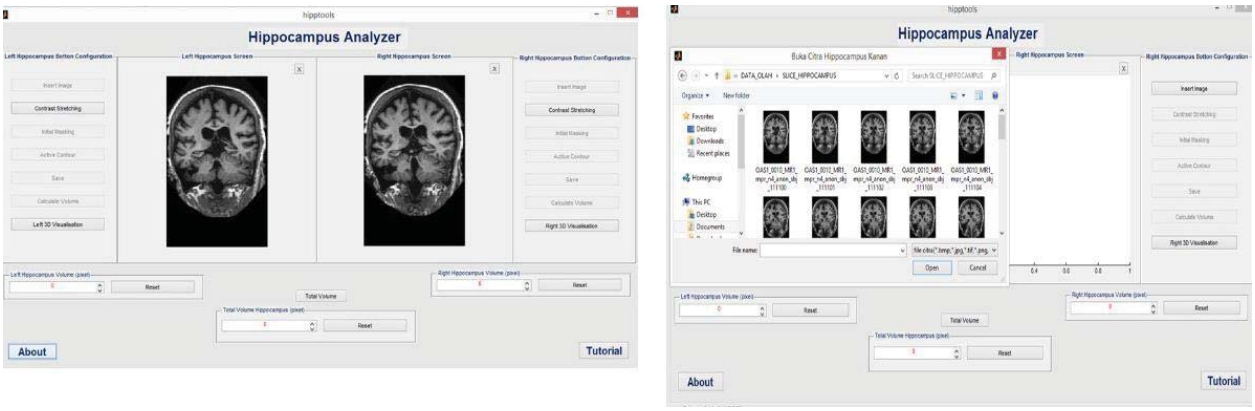

FIGURE 2. Display of Insert Image menu

The initial masking process in this experiment uses the *Roipoly* function in the MATLAB application. This function allows the user to perform MRI image segmentation interactively by following the contours of the hippocampus object, namely by creating dots around the hippocampus, where these points will ignore other areas around it. Figure 3 shows how the user creates contour points around the hippocampus to get the initial masking.

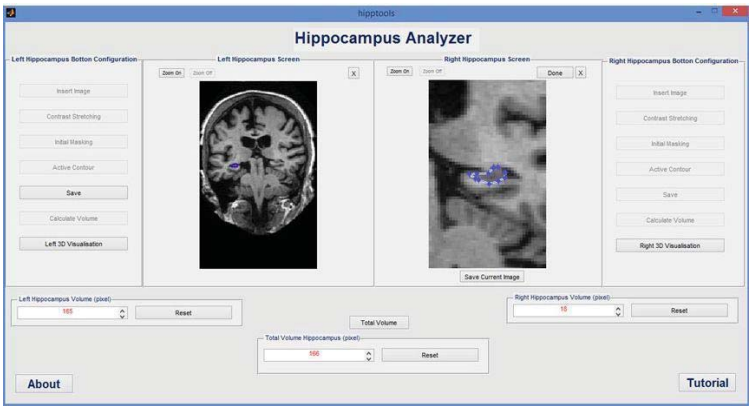

FIGURE 3. Initial masking process display

After the initial masking process is complete, the segmentation using the active contour method will be formed automatically by double-clicking the last point of the initial masking process. Figure 4 shows a menu display of the segmented hippocampus area.

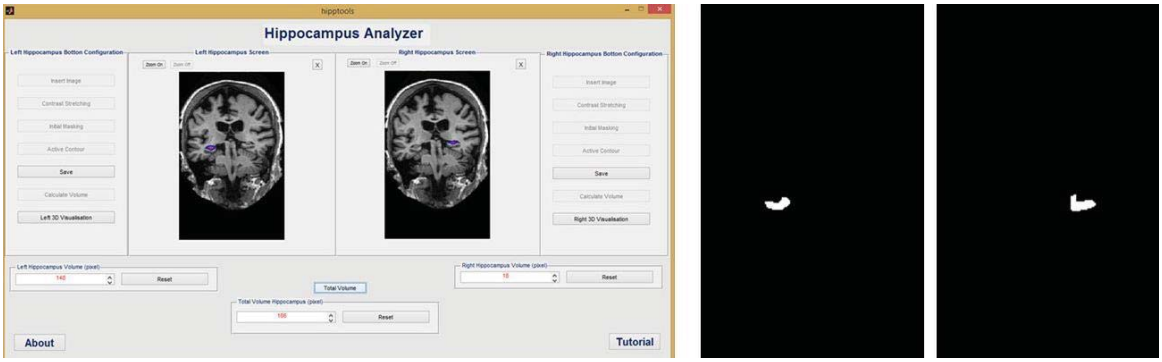

FIGURE 4. Display of the hippocampus segmentation result area

In calculating the volume of the hippocampus, the function used in the Matlab to do this addition is the sum function, with the details of sum (A, 1) the addition vertically and sum (A, 2) is the addition horizontally, and sum (A)

is the backward addition (z-axis). Using this algorithm to calculate the hippocampus volume for each coronal Alzheimer's MRI image is obtained. Figure 5 shows a view of the volume calculation and three-dimensional visualization.

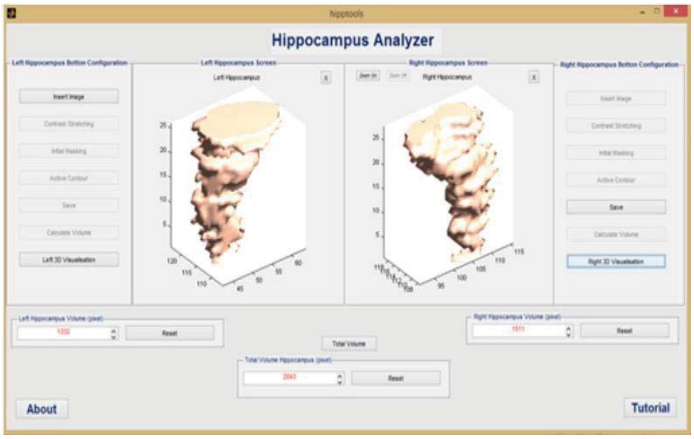

FIGURE 5. Display of volume calculation and 3D visualization

The results of implementing the MATLAB program made can be seen in the graph in Figure 6. The relationship between volume and CDR in the program's application shows that the average value for CDR 0 on the left hippocampus volume is 1973 pixels, the right-side hippocampus volume is 2055 pixels, and the total hippocampus volume is 4028 pixels. Then the average value for CDR 1 on the left hippocampus volume is 1252 pixels, the right hippocampus volume is 1253 pixels, and the total hippocampus volume is 2505 pixels. Meanwhile, the average value for CDR 2 on the left hippocampus volume is 731.5 pixels, the right hippocampus volume is 671 pixels, and the total hippocampus volume is 1402 pixels. It can be concluded that the volume of the left and right hippocampus of each hippocampus is not much different.

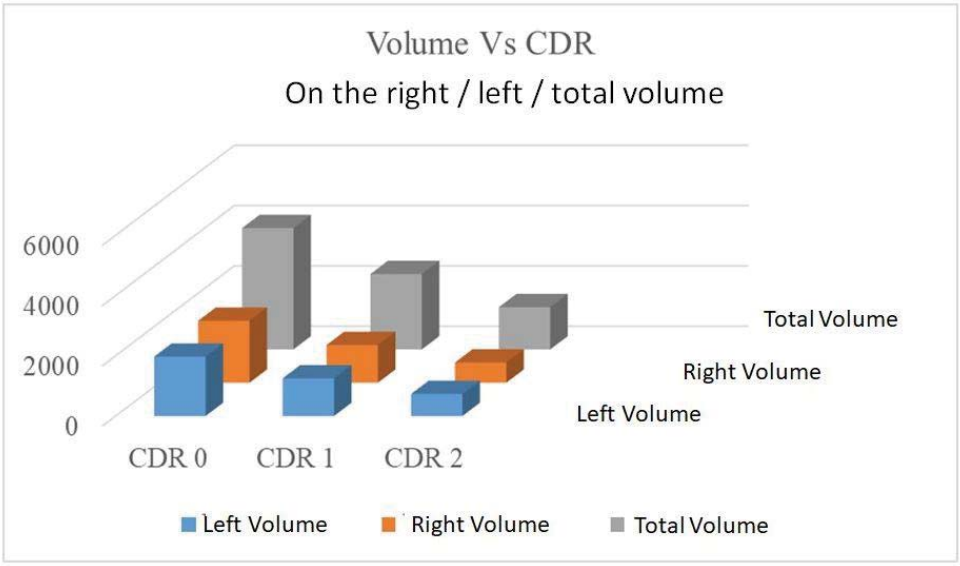

FIGURE 6. Graph of volume VS CDR

One of the performance measures in this tool developed with MATLAB is the execution time required to operate it. The relationship between CDR and operating time by the user results from the program's application showing that at CDR 0, the time used by the user is 74.1 minutes, then CDR 1 is 66.7 minutes, and CDR 2 is 53.5 minutes. This case shows that the lower the CDR value of an image, the longer it will calculate the volume. This case happens because the lower the CDR value, the greater the volume and the number of slices. Figure 7 shows this relationship.

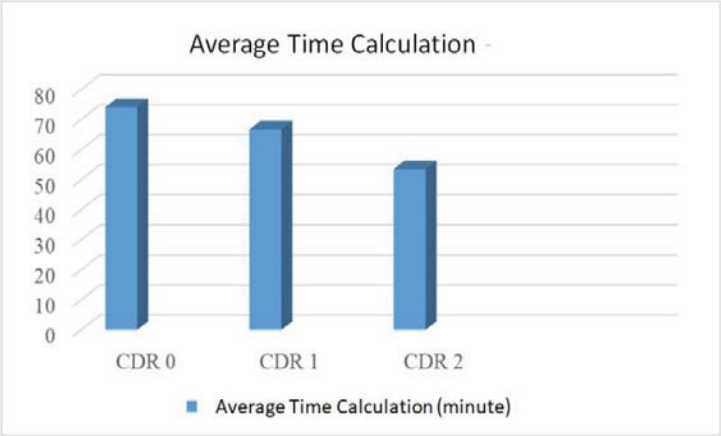

FIGURE 7. The graph of average time calculation

CONCLUSION

The design of a volume calculation and 3D visualization program using MATLAB, including the insert image stage, contrast stretching, initial masking, active contour, volume calculation, and 3D visualization, successfully calculates and visualizes coronal MRI image data the Alzheimer's hippocampus properly. This system could serve as a guideline for developing Computer-Aided Diagnosis for the next phase of Alzheimer's detection..

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REFERENCES

1. R. Supriyanti, C. T. Arachman, Y. Ramadhani, and H. B. Widodo, "Hippocampal Area Calculation Based on the Clinical Dementia Rating Scale on Sagittal MRI Image Slice," *Technol. Reports Kansai Univ.*, vol. 62, no. 02, pp. 151–158, 2020.
2. R. Supriyanti, A. R. Subhi, E. J. Ashari, F. Ahmad, Y. Ramadhani, and H. B. Widodo, "Simple Classification of the Alzheimer's Severity in Supporting Strengthening the Diagnosis of Patients based on ROC Diagram," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 982, no. 1, 2020, doi: 10.1088/1757-899X/982/1/012007.
3. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "CORONAL SLICES SEGMENTATION OF MRI IMAGES USING ACTIVE CONTOUR METHOD ON INITIAL IDENTIFICATION OF ALZHEIMER SEVERITY LEVEL BASED ON CLINICAL DEMENTIA RATING (CDR)," *J. Eng. Sci. Technol.*, vol. 14, no. 3, pp. 1672–1686, 2019.
4. J. C. Taylor, C. Romanowski, E. Lorenz, C. Lo, O. Bandmann, and J. Fenner, "Computer-aided diagnosis for (123I)FP-CIT imaging: impact on clinical reporting," *EJNMMI Res.*, vol. 8, 2018, doi: 10.1186/s13550-018-0393-5.
5. F. Retter, C. Plant, B. Burgeth, G. Botella, T. Schlossbauer, and A. Meyer-Bäse, "Computer-aided diagnosis for diagnostically challenging breast lesions in DCE-MRI based on image registration and integration of morphologic and dynamic characteristics," *EURASIP J. Adv. Signal Process.*, vol. 2013, no. 1, pp. 1–10, 2013, doi: 10.1186/1687-6180-2013-157.
6. P. Tiwari, J. Sachdeva, C. K. Ahuja, and N. Khandelwal, "Computer aided diagnosis system-A decision support system for clinical diagnosis of brain tumours," *Int. J. Comput. Intell. Syst.*, vol. 10, no. 1, pp. 104–119, 2017, doi: 10.2991/ijcis.2017.10.1.8.
7. A. Cahan and J. J. Cimino, "A learning health care system using computer-aided diagnosis," *J. Med. Internet Res.*, vol. 19, no. 3, 2017, doi: 10.2196/jmir.6663.

8. M. Zhu *et al.*, "Differentiation of pancreatic cancer and chronic pancreatitis using computer-aided diagnosis of endoscopic ultrasound (EUS) images: A diagnostic test.," *PLoS One*, vol. 8, no. 5, 2013, doi: http://dx.doi.org/10.1371/journal.pone.0063820.
9. A. Chauhan, D. Chauhan, and C. Rout, "Role of gist and PHOG features in computer-aided diagnosis of tuberculosis without segmentation," *PLoS One*, vol. 9, no. 11, 2014, doi: 10.1371/journal.pone.0112980.
10. M. N. Bajwa *et al.*, "Computer-aided diagnosis of skin diseases using deep neural networks," *Appl. Sci.*, vol. 10, no. 7, pp. 1–14, 2020, doi: 10.3390/app10072488.
11. L. de Santiago *et al.*, "A computer-aided diagnosis of multiple sclerosis based on mfVEP recordings," *PLoS One*, vol. 14, no. 4, pp. 1–20, 2019, doi: 10.1371/journal.pone.0214662.
12. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "Calculating Ventricle's Area based on Clinical Dementia Rating (CDR) Values on Coronal MRI image," in *20th International Conference on Computer-Based Patient Records and Error Prevention (ICCPREP) 2018*, 2018.
13. R. Supriyanti, A. Fanthoni, E. J. Ashari, Y. Ramadhani, and H. B. Widodo, "Active Contour Method for Identifying Area of Sagittal and Axial Slices to Identify the Severity of Alzheimer's disease," in *International Conference on Recent Advances in Engineering and Technology (ICRAET)*, 2019.
14. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "A Simple Tool For Identifying The Severity of Alzheimer's Based on Hippocampal and Ventricular Size Using A ROC Curve on a Coronal Slice Image," *Asian J. Inf. Technol.*, vol. 17, no. 7, pp. 321–327, 2018.
15. R. Supriyanti, A. R. Subhi, Y. Ramadhani, and H. B. Widodo, "Coronal slices segmentation of mri images using active contour method on initial identification of alzheimer severity level based on clinical dementia rating (CDR)," *J. Eng. Sci. Technol.*, vol. 14, no. 3, pp. 1672–1686, 2019.
16. J. Morris, "The Clinical Dementia Rating (CDR): current version and scoring rules.," *Neurology*, vol. 43, pp. 2412b-2414b, 1993.
17. R. Buckner *et al.*, "A unified approach for morphometric and functional data analysis in young, old, and demented adults using automated atlas-based head size normalization: reliability and validation against manual measurement of total intracranial volume.," *Neuroimage*, vol. 23, pp. 724–738, 2004, doi: 10.1016/j.neuroimage.2004.06.018.
18. E. Rubin *et al.*, "A prospective study of cognitive function and onset of dementia in cognitively healthy elders.," *Arch Neurol*, vol. 55, pp. 395–401, 1998.
19. Y. Zhang, M. Brady, and S. Smith, "Segmentation of brain MR images through a hidden Markov random field model and the expectation maximization algorithm," *IEEE Trans. Med. Imaging*, vol. 20, no. 1, pp. 45–57, 2001, doi: 10.1109/42.906424.
20. A. Fotenos, A. Snyder, L. Girton, J. Morris, and R. Buckner, "Normative estimates of cross-sectional and longitudinal brain volume decline in aging and AD," *Neurology*, vol. 64, pp. 1032–1039, 2005, doi: 10.1212/01.WNL.0000154530.72969.11.
21. R. Supriyanti, A. K. Marchel, Y. Ramadhani, and H. B. Widodo, "Coronal slice segmentation using a watershed method for early identification of people with Alzheimer's," *Telkomnika (Telecommunication Comput. Electron. Control.*, vol. 19, no. 1, pp. 63–72, 2020, doi: 10.12928/TELKOMNIKA.V19I1.15142.