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CEREBRAL INFARCTION FORECASTING USING DEEP LEARNING: A CNN APPROACH

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ABSTRACT:
Cerebrovascular accidents (CVAs), another name for brain strokes, are very serious medical conditions that can cause permanent impairments or even death. Healthcare providers can identify patients who are more likely to have a stroke and can take timely action to avoid strokes by using early stroke risk prediction. Predictive techniques, such as predicting the occurrence and prognosis of diseases and assisting physicians in prescribing treatment, are frequently employed in clinical decision-making. This approach of predicting analytical techniques for stroke was implemented using a deep learning network on a brain disease dataset. The objective of this model is to develop a deep learning application that uses a convolution neural network to identify brain strokes. Furthermore, three models have been created to forecast the results.

Keywords:
AI, CVA, CNN, Deep learning, User Interface.

Introduction:
Deep learning is a branch of machine learning which is based on artificial neural networks. It is capable of learning complex patterns and relationships within data. In deep learning, we don't need to explicitly program everything. It has become increasingly popular in recent years due to the advances in processing power and the availability of large datasets. Because it is based on artificial neural networks (ANNs) also known as deep neural networks (DNNs). These neural networks are inspired by the structure and function of the human brain's biological neurons, and they are designed to learn from large amounts of data. Brain strokes, or cerebrovascular accidents, are a significant cause of mortality and long-term disability worldwide. Early detection and prediction of strokes are crucial for timely intervention and prevention of severe consequences. Traditional methods of stroke prediction often rely on clinical risk factors and medical history, which may not capture subtle patterns or individual variations effectively. Deep learning techniques offer the potential to enhance stroke prediction by leveraging complex patterns from diverse data sources, including medical imaging, electronic health records, genetic information, and lifestyle factors. By training deep neural networks on large-scale datasets, we aim to develop a predictive model capable of accurately identifying individuals at high risk of experiencing a stroke within a given time frame. Machine Learning (ML) delivers an accurate and quick prediction outcome and it has become a powerful tool in health settings, offering personalized clinical care for stroke patients. ML and Deep Learning applications in health care are growing, nonetheless there is a greater need for further investigation in some research fields. Therefore, this study aimed to systematically review the state of the art on ML techniques for brain stroke and classify the research studies into 4 categories based on their functionalities or similarity. A total of 39 Studies were identified from the results of Science Direct web scientific database on ML for brain stroke from the year 2007 to 2019. Machine Learning (ML) through pattern recognition algorithms is currently becoming an essential aid for the diagnosis, treatment, and prediction of complications and patient outcomes in a number of neurological diseases. The evaluation and treatment of Acute Ischemic Stroke (AIS) have experienced a significant advancement over the past few years, increasingly requiring the use of neuroimaging for decision-making. In this review, we offer an insight into the recent developments and applications of ML in neuroimaging focusing on acute ischemic stroke. Ischemic strokes occur due to the loss of blood circulation in a particular zone of the brain. Magnetic resonance image analysis is done by the Neurologist to detect the lesion tissue in the brain image. The technique of physical identification of lesion area takes additional epoch. A Stroke is a health condition that causes damage by tearing the blood vessels in the brain. It can also occur when there is a halt in the blood

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flow and other nutrients to the brain. According to the World Health Organization (WHO), stroke is the leading cause of death and disability globally. A health risk appraisal function has been developed for the prediction of stroke using the Framingham Study cohort. The stroke risk factors included in the profile are age, systolic blood pressure, the use of antihypertensive therapy, diabetes mellitus, cigarette smoking, prior cardiovascular disease (coronary heart disease, cardiac failure, or intermittent claudication), atrial fibrillation, and left ventricular hypertrophy by electrocardiogram. Based on 472 stroke events occurring during 10 years' follow-up from biennial examinations 9 and 14, stroke probabilities were computed using the Cox proportional hazards model for each sex based on a point system.

2.SYSTEM TEST

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement. Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

2.1 Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.
Functional testing is centered on the following items:
Valid Input : identified classes of valid input must be
accepted. Invalid Input : identified classes of invalid input must be
rejected.Functions : identified functions must be exercised.
Output : identified classes of application outputs must be
exercised.Systems/Procedures: interfacing systems or procedures must be invoked.
Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

2.2 Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.
Test Results: All the test cases mentioned above passed successfully. No defects encountered.

3.0 IMPLEMENTATION AND RESULTS

3.1 INPUT DESIGN

```
<!DOCTYPE html>
{% load static %}
<html lang="en">

<head>
  <meta charset="utf-8">
  <title>index: page</title>
  <meta content="width=device-width, initial-scale=1.0" name="viewport">
  <meta content="" name="keywords">
  <meta content="" name="description">
```

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```
    <! -- Favicon -->
    <link href="{%static 'img/favicon.ico' %}" rel="icon">

    <! -- Google Web Fonts -->
    <link rel="preconnect" href="https://fonts.googleapis.com">
    <link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
    <link
href="https://fonts.googleapis.com/css2?family=Heebo:wght@400;500;600&family=Inter
:wght@700;800&display=swap" rel="stylesheet">

    <! -- Icon Font Stylesheet -->
    <link  href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.10.0/css/all.min.css"
rel="stylesheet">
    <link              href="https://cdn.jsdelivr.net/npm/bootstrap-icons@1.4.1/font/bootstrap-
icons.css" rel="stylesheet">
    <! -- Libraries Stylesheet -->
    <link href="{%static 'lib/animate/animate.min.css'%}" rel="stylesheet">
    <link href="{%static 'lib/owlcarousel/assets/owl.carousel.min.css'%}" rel="stylesheet">

    <! -- Customized Bootstrap Stylesheet -->
    <link href="{%static 'css/bootstrap.min.css'%}" rel="stylesheet">

    <!-- Template Stylesheet -->
    <link href="{%static 'css/style.css'%}" rel="stylesheet">
</head>
<body>
    <div class="container-xxl bg-white p-0">
        <! -- Spinner Start -->
        <div id="spinner" class="show bg-white position-fixed translate-middle w-100 vh-100
top-50 start-50 d-flex align-items-center justify-content-center">
            <div  class="spinner-border  text-primary"  style="width:  3rem;  height:  3rem;"
role="status">
                <span class="sr-only">Loading...</span>
            </div>
        </div>
        <! -- Spinner End -->
        <! -- Navbar Start -->
        <div class="container-fluid nav-bar bg-transparent">
            <nav class="navbar navbar-expand-lg bg-white navbar-light py-0 px-4">
                <a  href="index.html"  class="navbar-brand  d-flex  align-items-center  text-
center">
                    <div class="icon p-2 me-2">
                        <img  class="img-fluid"  src="{%static  'img/icon-deal.png'%}"  alt="Icon"
style="width: 30px; height: 30px;">
                    </div>
                    <h1 class="m-0 text-primary">Brain Stroke Prediction</h1>
                </a>
                <button type="button" class="navbar-toggler" data-bs-toggle="collapse" data-bs-
target="#navbarCollapse">
```

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```
            <span class="navbar-toggler-icon"></span>
          </button>
          <div class="collapse navbar-collapse" id="navbarCollapse">
            <div class="navbar-nav ms-auto">
              <a href="/index " class="nav-item nav-link active">Home</a>
              <a href="/adminapp/login" class="nav-item nav-link">Admin</a>


              <a href="/login" class="nav-item nav-link">User</a>
            </div>
            <a href="" class="btn btn-primary px-3 d-none d-lg-flex"></a>
          </div>
        </nav>
      </div>
      <! -- Navbar End -->


      <! -- Header Start -->
      <div class="container-fluid header bg-white p-0">
        <div class="row g-0 align-items-center flex-column-reverse flex-md-row">
          <div class="col-md-6 p-5 mt-lg-5">
            <h1 class="display-5 animated fadeIn mb-4">Brain <span class="text-
primary">Stroke</span> Prediction </h1>
            <p class="animated fadeIn mb-4 pb-2"> Using
              Using Deep Learning</p>
            <a href="" class="btn btn-primary py-3 px-5 me-3 animated fadeIn">Get
Started</a>
          </div>
          <div class="col-md-6 animated fadeIn">
            <div class="owl-carousel header-carousel">
              <div class="owl-carousel-item">
                <img class="img-fluid" src="{%static 'images/brain.webp'%}" alt="">
              </div>
              <div class="owl-carousel-item">
                <img class="img-fluid" src="{%static 'images/brain.webp'%}" alt="">
              </div>
            </div>
          </div>
        </div>
      </div>
      <! -- Header End -->
```

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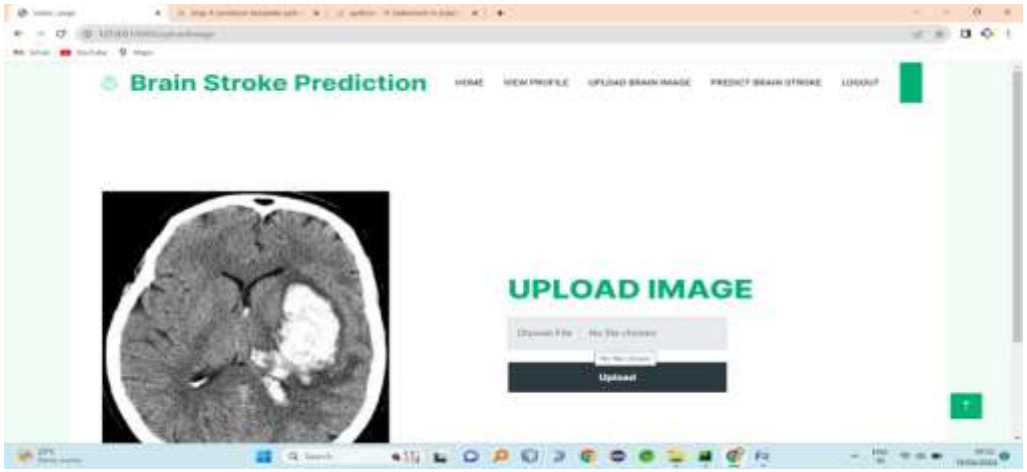

Fig:1 User View Predicted file

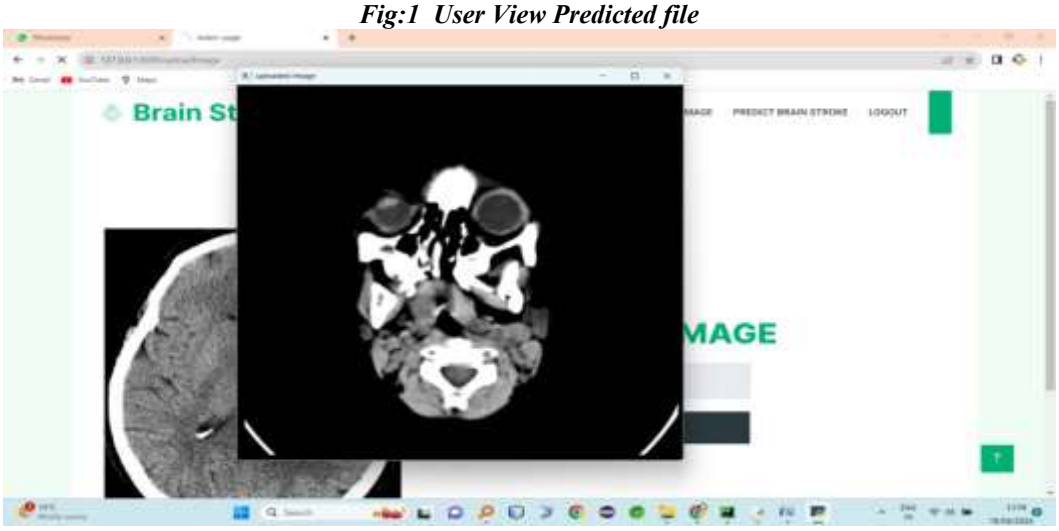

Fig: 2 View the Status

4.0 CONCLUSION

In this work, we successfully developed a deep learning-based system for predicting brain strokes. By leveraging advanced neural networks and thorough data analysis, we have taken a significant step towards improving brain stroke prediction. Our model demonstrated promising accuracy and potential as a tool for early detection. By leveraging advanced neural networks and thorough data analysis, we have taken a significant step towards improving brain stroke prediction. Further research and clinical validation are essential for realizing the full potential of this technology in healthcare. We were able to create a deep learning-based system for brain stroke prediction in this study. As an early detection tool, our model showed promising accuracy and potential. With the use of sophisticated neural networks and careful data analysis, we have made great progress in enhancing brain stroke prediction. To fully utilize this technology in healthcare, more investigation and clinical validation are required.

REFERENCES

1) Manisha Sirsat, Eduardo Ferme, Joana Camara, “Machine Learning for Brain Stroke: A Review,” Journal of stroke and cerebrovascular diseases: the official journal of National Stroke Association (JSTROKECEREBROVASDIS), 2020.
2) Harish Kamal, Victor Lopez, Sunil A. Sheth, “Machine Learning in Acute Ischemic Stroke

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(IJETRM)
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Neuroimaging," Frontiers in Neurology (FNEUR), 2018.
3) Chuloh Kim, Vivienne Zhu, Jihad Obeid and Leslie Lenert, "Natural language processing and machine learning algorithm to identify brain MRI reports with acute ischemic stroke," Public Library of Science One (PONE), 2019.
4) R. P. Lakshmi, M. S. Babu and V. Vijayalakshmi, "Voxel based lesion segmentation through SVM classifier for effective brain stroke detection," International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 2017.
5) Gangavarapu Sailasya and Gorli L Aruna Kumari, "Analyzing the Performance of Stroke Prediction using ML Classification Algorithms," International Journal of Advanced Computer Science and Applications (IJACSA), 2021.
6) "Probability of Stroke: A Risk Profile from the Framingham Study" - Philip A. Wolf, MD; Ralph B. D'Agostino, PhD, Albert J. Belanger, MA; and William B. Kannel, MD
7) "Development of an Algorithm for Stroke Prediction: A National Health Insurance Database Study" - Min SN, Park SJ, Kim DJ, Subramaniyam M, Lee KS
8) P. Govindarajan, R. K. Soundarapandian, A. H. Gandomi, R. Patan, P. Jayaraman, and R. Manikandan, "Classification of stroke disease using machine learning algorithms," Neural Computing & Applications, vol. 32, no. 3, pp. 817–828, 2020.
9) T. Kansadub, S. -ammaboosadee, S. Kiattisin, and C. Jalayondeja, "Stroke risk prediction model based on demographic data," in Proceedings of the 2015 8th Biomedical Engineering International Conference (BMEiCON), pp. 1–3, Pattaya, - ailand, November 2015.
10) S. Y. Adam, A. Yousif, and M. B. Bashir, "Classification of ischemic stroke using machine learning algorithms," International Journal of Computer Application, vol. 149, no. 10, pp. 26–31, 2016