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# A Deep Learning Framework for Recognizing Developmental Disorders

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***Abstract: Machine learning, which is a subcategory of artificial intelligence, contains deep learning. A method called artificial intelligence allows a computer to mimic human behaviour. Machine learning is a method to develop Intelligence by using trained algorithms data. A form of machine learning called "deep learning" was influenced by the way the human brain is organized.***
***This arrangement is referred to as an artificial neural network in deep learning for testing the effectiveness of the framework, a new data collection made up of images of subjects with these disabilities was created. This model has been tested on a wide spectrum of ages and individual disorders. It has also been contrasted to a different model that performs the same function by utilising human intellect to recognise various developmental disorders. The outcomes show that the model can identify individuals with all these developmental issues with a 98.80% efficacy and the ability to differentiate between different disabilities perform better than normal human intelligence.***

## I. INTRODUCTION

A severe chronic disability in people known as a "developmental disorder" may be caused by damage to specific brain regions, physical organs, or a mix of both. Functional limitations in key daily tasks like self-direction, mobility, self-care, communication, and social behaviour are likely to be present in subjects with these disabilities. These limitations may be brought on by a variety of causes, such as birth injuries, genetic mutations, early-life trauma, and brain injury sustained during pregnancy or delivery. Between the ages of three and seventeen, 15% of American children have one or more developmental disorders. The creation of assistive technologies for those with developmental impairments is urgently needed given the sheer number of people who are impacted by such issues. According to reports, many of these diseases are characterised by facial dysmorphism. A model that can recognise individuals with cognitive and developmental problems based on their face representations is what the suggested study aims to develop.

## II. LITERARY REVIEW

An outline of the various development issues that are considered in the experiment, as well as an explanation of the previous computer visual methods used to recognise them. This part has discussed disabilities.

### A. *Disorders Of Development*

Below is a list of the neurodevelopmental abnormalities that were taken into consideration for the trials, along with a short description of each disorder's causes and signs.

1) *Cerebral Palsy (CP):* Cerebral palsy (CP), a group of illnesses, affects a person's posture, equilibrium, and movement. Cerebral palsy is the most common type of mobility disability in kids. Everything affecting the brain is considered "cerebral," as the term suggests. The medical word for problems with mobility or practicality is palsy. Because of abnormal brain growth or damage to the developing brain, people with CP have trouble controlling their muscles.
2) *Autism Spectrum Disorder (ASD):* Autism spectrum disorder (ASD), a developmental impairment, is brought on by variations in the brain. Some people with Autism exhibit a distinctive trait, such as a genetic disorder. There are still unidentified additional factors. ASD is thought to be caused by a variety of underlying factors that interact to alter how individuals typically develop. We still don't completely comprehend how these factors affect people with ASD.

 

3) *Down Syndrome (DS):* A second complete or partial duplicate of chromosome 21 is produced as a result of abnormal cell division, which causes the genetic condition known as Down syndrome. The bodily characteristics and behavioural abnormalities of Down syndrome are caused by this excess genetic material. People with Down syndrome may have varying degrees of cerebral impairment and cognitive delays.
4) *Fetal Alcohol Spectrum Syndrome(FASD):* Children who were exposed to alcohol while their moms were pregnant suffer from foetal alcohol syndrome. Foetal alcohol syndrome causes both growth problems and cerebral damage. Despite the fact that each foetal alcohol syndrome child's problems are distinct, the abnormalities are always present.
5) *Intellectual Disabilities:* Intellectual impairment (ID), formerly known as mental retardation and also known as general learning disorder in the UK, is a generalised neurodevelopmental condition with substantially lower intellectual and adaptive performance [3]. Having an IQ of less than 70 and having at least two adaptive behaviours that are necessary for daily living impaired are signs of the condition.
6) *Progeria (PG):* A very rare genetic condition known as progeria, also known as Hutchinson-Gilford syndrome, causes infants to age more rapidly, starting in the first two years of life. Progeria infants typically seem healthy at delivery. Warning signs and symptoms like sluggish development and hair loss start to emerge during the first year.


Figure 1. A sample of subjects of various developmental disorders

## III. EXPERIMENTATION

A description of the dataset is provided below, along with details of different testing cases that the model was tried on.

### A. *Dataset Summary*

Data gathering was difficult because of sensitive issues like privacy and other delicate issues. The data includes age, gender, and the specific sort of developmental problem. Additionally, images of individuals suffering from different diseases were gathered from a variety of online resources.

### B. *Experimental Scenarios*

We considered four different experimental situations to assess the performance of the proposed model on the given data set. Table 1 includes a detailed summary of the data as well as the various developmental issues. For a specific experiment, the material has been divided into sections pertaining to various age groups. Table 2 lists the information that has been collected. The comment contains the age group information.

| Developmental disorder | Number of images |
|---|---|
| ASD | 91 |
| Down syndrome | 537 |
| Foetal alcohol syndrome | 55 |
| Cerebral palsy | 175 |
| Intellectual disabilities | 136 |
| Progeria | 132 |
| Total | 1126 |

Table 1

| Age group | Number of sample images |
|---|---|
| 0-6 | 107 |
| 6-12 | 133 |
| 12 and above | 98 |
| Total | 338 |

Table 2

1) *Scenario 1:* The proposed model was tested on a dataset that included individuals with normal faces as well as those with different developmental disabilities. The objective of this research was to distinguish between individuals with normal characteristics and those who had cognitive impairments.
2) *Scenario 2:* In this scenario, the presence of normal human faces from the LFW dataset was used to evaluate each of the six disabilities separately.
3) *Scenario 3:* The model's test participants all had cognitive disabilities. This exercise was designed to assess how well the model identified a specific impairment among other disabilities.
4) *Scenario 4:* The effectiveness of the proposed algorithm was assessed using a dataset made up of both normal and disabled subjects in the same age groups.

## IV. ANALYSIS

In this section, an analysis of the findings from the prior section has been completed.

### A. *Scenario 1*

With an accuracy of 98.80, the recommended model outperformed each hand made feature classifier model as well as a single CNN trained on the Alex-Net architecture.

### B. *Scenario 2*

For all impairments, high mean average accuracy (MAP) and mean average recall (MAR) were frequently attained. The most unexpected findings came from the participants, who were diagnosed with autism spectrum disorder (ASD). Because it was challenging to recognise individuals with ASD using only visual cues, the authors were unprepared for such positive findings.

### C. *Scenario 3*

The suggested model was compared to a model that classified various illnesses using human intelligence by selecting a specific disability from a list of disabilities. The model outperformed manual categorization by a wide margin. The proposed mode outperformed the manual categorization technique in terms of recognition rate, with the exception of Down syndrome. It is important to note that the classification was done by regular people, not experts in the area of cognitive disability.

 

### *D. Scenario 4*

The model's MAR and MAP results for subjects in the 0–6 year age range were the highest of all the other age groups that were taken into account, coming in at 94.52% and 94.81%, respectively.

## V. CONCLUSION

In the paper, a strategy for identifying developmental mental diseases is proposed. The suggested framework used CNN to extract both global and local features. The efficacy and dependability of the proposed framework for identifying developmental issues on various bases were demonstrated through a number of experiments. We also present a fresh data collection with images of individuals with six distinct developmental anomalies. The age and gender of some of the data are also marked. The findings unequivocally demonstrate the effectiveness of deep learning frameworks in identifying these diseases and the necessity of using computer vision-based frameworks to diagnose them. Developmental problems can be quickly initially diagnosed using the framework. The direction of the future.

## VI. ACKNOWLEDGMENT

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## REFERENCES

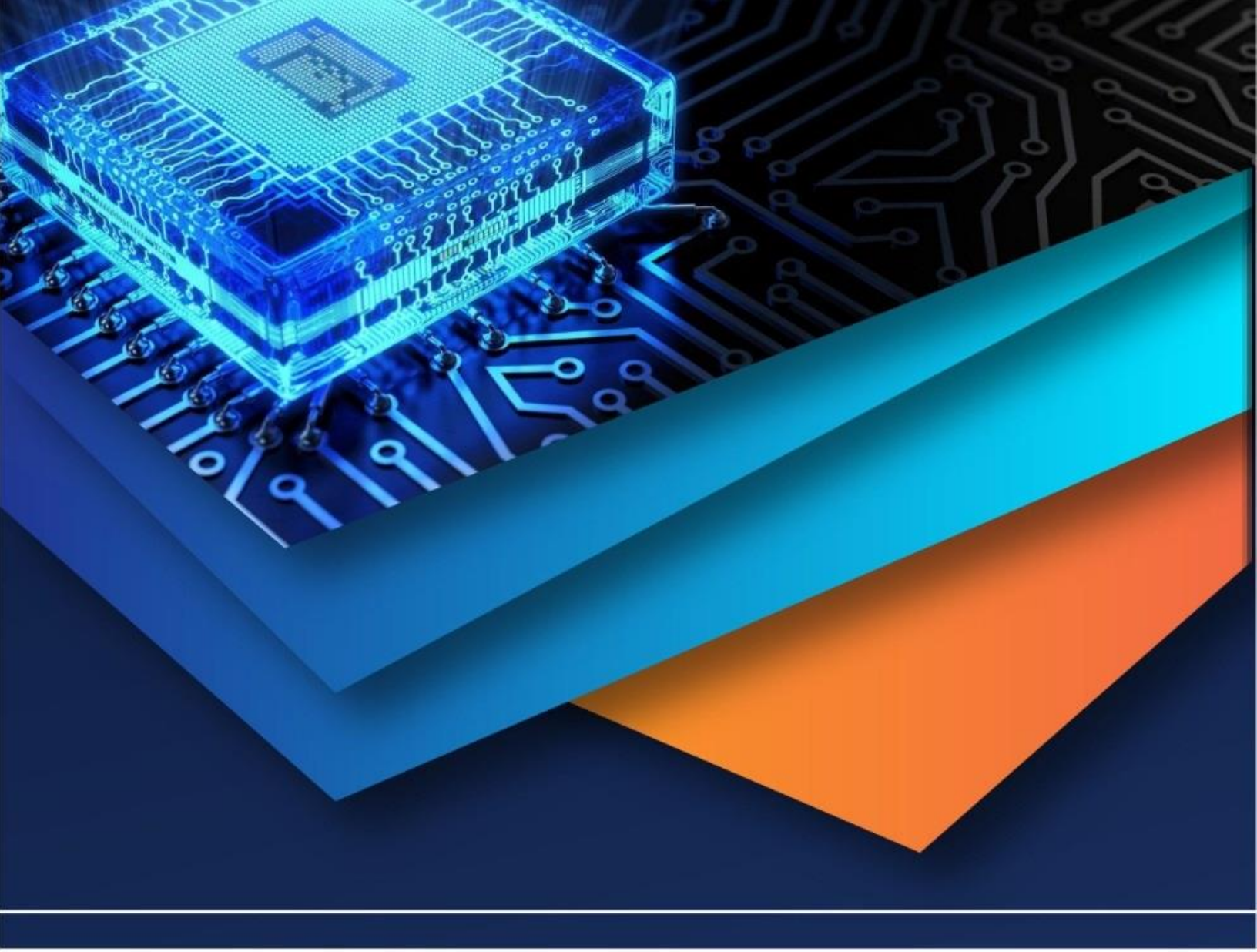
[1] J. Baio. Prevalence of autism spectrum disorders: Autism and developmental disabilities monitoring network, 14 sites, united states, morbidity and mortality weekly report. surveillance summaries. volume 61, number 3. Centers for Disease Control and Prevention, 2012.

[2] C. A. Boyle, S. Boulet, L. A. Schieve, R. A. Cohen, S. J. Blumberg, M. Yeargin-Allsopp, S. Visser, and M. D. Kogan. Trends in the prevalence of developmental disabilities in us children, 1997–2008. Pediatrics, 127(6):1034–1042, 2011.

[3] K. Burc¸in and N. V. Vasif. Down syndrome recognition using local binary patterns and statistical evaluation of the system. Expert Systems with Applications, 38(7):8690–8695, 2011.

[4] M. Iivanainen. Causes of mental retardation. ActaNeurolog-icaScandinavica, 69(S98):246–247, 1984.



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