

A Detailed Study of Neural Network Applications and Challenges

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ABSTRACT

This is a study of neural networks applications in reality situation. It gives a scientific classification of Artificial neural networks (ANNs) and outfit the user with information and flow and rising patterns in ANN applications research and territory of center for analysts. Moreover, the investigation presents ANN application challenges, commitments think about exhibitions and studies techniques. The examination covers numerous uses of ANN strategies in different controls which incorporate processing, science, designing, prescription, natural, farming, mining, innovation, atmosphere, business, expressions, and nanotechnology, and so on. The investigation surveys ANN commitments look at exhibitions and studies techniques. The examination found that neural-organize models, for example, feed forward and criticism engendering Artificial neural networks are performing better in its application to human issues. Accordingly, we proposed feed forward and input spread ANN models for inquire about spotlight dependent on information investigation factors like precision, preparing speed, dormancy, adaptation to non-critical failure, volume, adaptability, assembly, and execution. Also, we prescribe that as opposed to applying a solitary strategy, future research can concentrate on consolidating ANN models into one system wide application.

Keywords: Artificial Neural Networks, Machine Learning, Speech Recognition.

I. INTRODUCTION

As of late artificial neural networks (ANNs) has become famous and supportive model for arrangement, grouping, design acknowledgment and forecast in numerous orders. ANNs are one sort of model for AI (ML) and has gotten moderately serious to customary relapse and factual models with respect to convenience [1]. As of now, computerized reasoning (AI, neural networks, profound learning, and mechanical), data security, huge information, distributed computing, web, and criminological science are largely hotspots and energizing subjects

of data and correspondence innovation (ICT). ANNs full applications can be assessed regarding information examination factors, for example, exactness, handling speed, inertness, execution, adaptation to non-critical failure, volume, adaptability and combination [2, 3]. The incredible capability of ANNs is the fast preparing gave in a gigantic equal usage and this has increased the requirement for explore right now. ANNs can be created and utilized for picture acknowledgment, normal language handling, etc. These days, ANNs are for the most part utilized for widespread capacity guess in numerical ideal models in light of their

incredible properties of self-learning, adaptively, adaptation to internal failure, nonlinearity, and progression in contribution to a yield mapping [5]. These information investigation factors give more motivation behind why ANNs are powerful, effective and fruitful in giving a significant level of capacity in taking care of complex and non-complex issues in numerous circles of life. ANNs are equipped for dealing with issues in horticulture, science, medicinal science, training, fund, the board, security, building, exchanging product and workmanship. Remembering issues for assembling, transportation, PC security, banking, protection, properties the board, showcasing, vitality, and those difficulties that can't be tackle by the computational capacity of customary methods and ordinary science. Regardless of these broad uses of ANNs, there is an expanding need to address the issue of embracing an efficient methodology in ANNs advancement stage to improve its exhibition. For example, a way to deal with address central point and themes in a selection of informational indexes (size, volume, little, enormous and something else), the exactness of information, information instrument, information institutionalization, sort of information inputs, information division, and information preprocessing, approvals, handling and yield systems.

1. Artificial Neural Networks

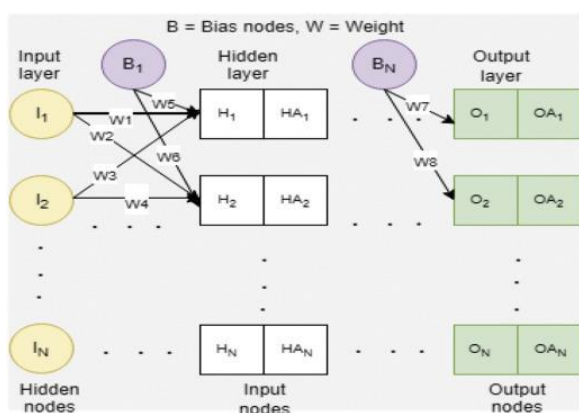


Fig. 1 A Typical Neural Network Architecture.

1) Neural Networks (NN) layers are autonomous of each other; that is, a particular layer can have a discretionary number of hubs. This subjective number of hubs is called predisposition hub. The predisposition hubs constantly set as equivalent to one. In similarity, the predisposition hubs resemble the balance in direct relapse given as; $y = \text{hatchet} + b$, where "an" is the coefficient of autonomous "x" and afterward "b" is called incline. A predisposition significant capacity is to furnish hub with a consistent worth that is trainable, notwithstanding the typical sources of info got by the system hub. Significantly, an inclination esteem empowers one to move the actuation work either to one side or the left, that can be scientific for ANN preparing achievement. At the point when the NN utilized as a classifier, the information and the yield hubs will coordinate information highlights and yield classes. Nonetheless, when the NN is utilized as a capacity guess, it for the most part has an info and a yield hub. Be that as it may, the quantity of planned concealed hubs fundamental more prominent than those of information hubs.

2. ANN Emerging Successes and Applications

In the ongoing occasions different fruitful utilized of ANNs developed in catalysis, meteorology, science, science, material science, atomic material science, high-vitality physical science, and different territories of science. These days, ANN has discovered uses in another territory, for example, in catalyzing particularly in the substance mechanical area. Catalysis is term as the huge vitality in the modernization procedure of synthetic ventures. It guarantees compelling, productive and effective utilization of limited common assets, it forestalls waste and air contamination, and gives wellbeing to the mechanical division. Catalysis becomes the establishment of huge scale activities in regards to estimate in science and petro chemistry condition. In any case, as request changes, new natural difficulties currently require new synergist arrangements. For

instance, changed in the vitality economy has driven an expanding interest for coal and gas, thus given space for new difficulties for reactant innovation in the regions like liquefaction in material science [7,8]. As of late, there have been accounted for instances of ANNs applications to catalysis examine in the writing.

2) The exploratory outcome shows forecast for speed, burden, and blunder. Wavelet systems are been utilized widely and viably in various designing fields for characterization, ID and control issues. Wavelet systems are feed forward networks that utilize wavelets as enactment capacities. ANNs application to sunlight based radiation information estimating with versatile wavelet arrange has been valuable.

The latest work by Li, and Liu [4], utilizes a versatile wavelet arrange design in finding a suitable model for estimating the every day aggregate sum of sun oriented radiation. The every day aggregate sum of sun based radiation is considered the most noteworthy in the expectation of the exhibition of sustainable power source like sun oriented, critically in estimating photovoltaic (PV) marvel of intensity frameworks. That is in the change of light into power. The trial results exhibit that the ANN model predicts every day aggregate sum of sun oriented radiation parameters with a precision of 97% with a mean outright rate blunder of 6%. Additionally, Li, and Liu proposed a model on the enhancement of the sun oriented water radiator and execution expectation utilizing information based AI procedure. The outcome shows that the model speculation that can applied in various areas in any event, for climate information, as encompassing temperature and daylight period. As of late ANN application to science and material science issues has progressively famous and triumphs [5]. Numerous utilizations of estimate systems and standard ways to deal with information fitting are performing better in NN. NN give more precision a lower number of customizable parameters than some other techniques. Learning in NNs is comprehended when it reconstructs hyper

surfaces together with an example focuses, speculation, and insertion. NNs apply sigmoidal capacities to re-structures or changes, expressed in many material science and science issues. Subsequently, settling a subjective information fitting issue by applying a solitary layer net design if there is no limitation in sigmoidal capacities applied [5].

3. ANN Models in Different Application Areas.

Numerous counterfeit neural system methods have been received in the scholarly community and enterprises to address the difficulties in PC vision, discourse and example acknowledgments, face arrangement, and discovery. These incorporate;

1.4.1. Speech recognition

The utilization of ANNs has become uniqueness and comprehended in the capacity of its achievements in discourse or correspondence acknowledgment. In the previous decades, ML calculations have applied broadly in territories like acoustic displaying and ASR (programmed discourse acknowledgment) [8].

1.4.2. Computer vision

PC vision targets making PCs to precisely comprehend and process visual information productively like recordings [8] and pictures [9, 10]. Fundamental objective of PC vision is to furnish PCs with the sort of capacity of man mind usefulness. Hypothetically, PC vision implies the legitimate control which contemplates how to isolate information from pictures in counterfeit structures. Sub spaces of PC vision incorporate article identification and item acknowledgment, object estimation, object position, occasion recognition, scene recreation, picture reclamation, picture altering, video improvement, and measurable learning. Thus, in PC vision, ANN models are extremely helpful.

1.4.3. Pattern Recognition

The ongoing improvement in profound learning models has given novel approaches to manage the issue in acknowledgment of an example or example

acknowledgment (PR). PR is a logical region that concentration in recognizable proof of grouping in each information [2, 3]. PR is a general idea that encompasses different subdomains, for example, discourse labeling, relapse, grouping naming and order. There are quickly expanding requirements for data preparing and yield, because of modern improvement, that has new pattern and difficulties to PR.

1.4.4. Face alignment

Face arrangement assumes a job that is critical in different visual applications. As of late ANNs has asserted triumphs in face arrangement and face acknowledgment and different models have demonstrated victories. Strikingly DL procedures can be applying to disclose hereditary variations to recognize pathogenic variations [7, 8]. Typically, consolidated comment subordinate consumption calculation is famously applied to decipher the coding and non-coding variations.

1.4.5. Detection

Identification in medicinal determination, security, picture objects, money related anomaly, a shortcoming in a framework, are being upgraded through ANNs application. Therefore, ANN assumes a basic job in the discovery, especially when applied to bosom disease. The presentation of ANN can be generally contrasted and different methodologies in wrongdoing identification, for example, DNA and action profiling and the utilization of enormous information for money related wrongdoing location. In spite of the numerous productions in the usage of

NN in various therapeutic difficulties, yet there are hardly any surveys study accessible that clarify the engineering in improving the discovery strategies with respect to execution, precision, affectability, and explicitness.

Therefore, identification ability is usually known subdomain or registering in PC vision which looks to comprehend, find, group or separate the focused on picture objects. A model during location errands, a picture can be examined to know certain exceptional highlights or qualities. For example, utilizing of picture discovery in restorative analysis, particularly strange cells or tissues in medicinal pictures. Regularly, customary strategies are base close by structured highlights and difference induction instruments. The DL procedures require crude picture information. Additionally, DL methods applied to Glaucoma location with promising outcomes. All the more additionally, ANN has utilized in picture change and PC vision identification in both common and military difficulties. As of late, picture recognition applying in remote detecting, debacle assessment, videoing and observation. Besides, ANNs have been applying to human-robot association frameworks that yielded outcomes.

II. The Result of ANN Application

The aftereffect of ANNs application to various regions of lives and teaches as found in the writing is available in Table 1.

Table 1. Summarized result on ANNs application regarding prediction, pattern recognition and Classification.

Example of many fields of applications of ANNs	Prediction	Pattern recognition	Classification	Total
Security	20	18	2	40
Science	25	25	2	52
Engineering	22	7	2	31
Medical science	10	5	2	17
Agriculture	3	3	2	7

Example of many fields of applications of ANNs	Prediction	Pattern recognition	Classification	Total
Finance	10	15	2	27
Bank	5	15	2	22
Weather and climate	2	15	2	19
Education	30	15	2	47
Environmental	10	15	2	27
Energy	5	15	2	22
Mining	2	15	2	19
Policy	2	2	2	6
Insurance	5	4	2	11
Marketing	5	5	2	12
Management	40	2	2	44
Manufacturing	12	15	5	32
Other fields	52	11	10	71

Table 1 indicates that ANN models are useful in classification, pattern recognition, clustering, optimization and prediction. The relationships among many areas of ANN applications further presented in fig.2

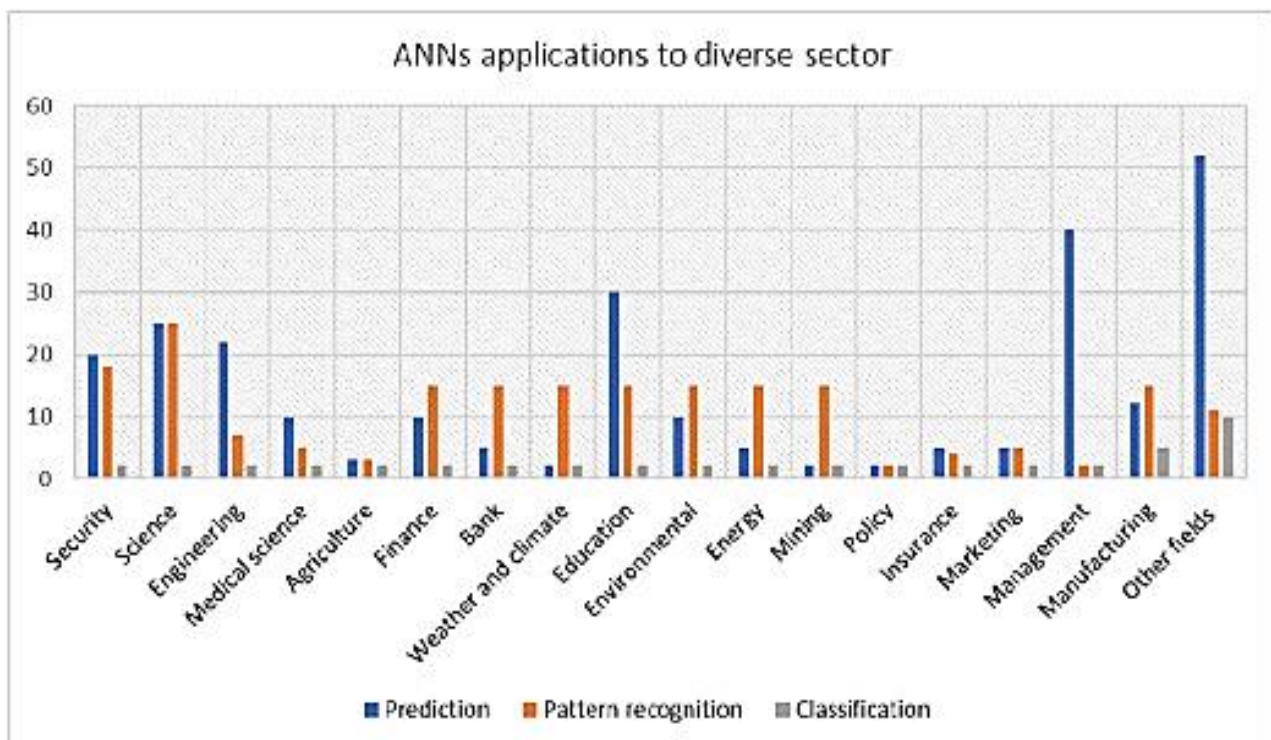


Fig. 2. Reviewed ANN applications framework.

The relationship among the particular fields further uncovers that ANN can apply to any regions of studies, enterprises, and calling. The histogram uncovers the regions of use of ANN in security, science, designing, restorative science, horticulture, money, banking, climate and atmosphere, training, ecological, vitality, mining, protection, advertising and so on. Subsequently, intrigued analysts can investigate the ANN application in these regions or numerous other rising regions for future research for better answer for issues in their fields. Since there is constantly a calculation, model, plan, and structure for any issue.

III. CONCLUSION

The ANNs application territories considered in the study incorporate; PC security, medicinal science, business, account, bank, protection, the financial exchange, power age, the executives, atomic industry, mineral investigation, mining, unrefined petroleum portions quality expectation, crops yield forecast, water treatment, and arrangement. It is intriguing to realize that neural system information investigation includes precision, handling speed, adaptation to internal failure, dormancy, execution, volume, and versatility. Numerous new and upgraded information the executives and information investigation approaches help in the administration of ANN. Making examination from the accessible information that guide in to a great extent organizing data and give its human business esteem. The ANN investigations thusly help in battling difficulties and alleviate any potential dangers. ANN are new computational model with quick and huge uses for dealing with different complex true issues. ANNs notoriety lies in data preparing attributes to learning power, high parallelism, adaptation to internal failure, nonlinearity, clamor resilience, and capacities of speculation.

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