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**Efficient Working Employee Performance Prediction using DenseNet Compared over ResNet50 with Improved Accuracy**

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**ABSTRACT**

**Aim:** The main aim of this research study is to improve the accuracy value of employee performance prediction with an online dataset using different DL (Deep Learning) concepts like DenseNet and ResNet50.**Introduction:** The issues that traditional techniques have with their more false prediction rate, relatively low accuracy rate, and less generalization ability are caused by the diversifying of the employee performance prediction model. **Materials and Methods:** The suggested model is used to increase the accuracy rate from the employee online dataset using DenseNet and ResNet50. The online employee dataset is applied for an experimental stage, and the recommended model is processed with the help of python programming software. **Results and Discussion:** The outcome of the designed employee performance prediction model is measured. The recommended DenseNet and ResNet50 classification accuracy level is confirmed with 91.60%. DenseNet and ResNet50 processing time is also calculated as 0.5 seconds. **Conclusion:** This developed research process result says that it is finalized that the developed DenseNet model makes better results in employee performance prediction from the online dataset than the ResNet50 model

**Keywords:** Employee Dataset, DenseNet, ResNet50, AccuracyValue, Python Programming, Prediction

**INTRODUCTION**

The achievement of any enterprise is based on its workforce. Companies that are aware of this are worried about the productivity of their employees. At the various levels of the enterprise, efficiency has a compounding impact, which means that strong production at a basic level of organization opens the way for increased productivity at the top-level management. In light of this, companies must analyze their employees' effectiveness. A worker's performance cannot be traced to a permanent quality. Each person has a unique skill set and collection of behavioral traits. As a result, data from all fields of endeavor must be acquired for analyzing workers' performance [1]. The success of the company entails staff performance in achieving its objectives. A requirement for businesses to succeed is the ability to predict potential job performance [3].

Over the past 5 years, nearly 300 research magazines were available on GS (Google Scholar) and more than 150 research magazines were offered in science direct journals with various DL concepts. Several publications on employee performance prediction using ML and DL methods have been published recently. Because of the rising likelihood of predicting employee performance prediction, current research utilizes cutting-edge IT techniques like DL algorithms, which can be used to predict employee performance from the employee’s online dataset.

Since the performance of the employees has a detrimental impact on operational productivity and long-term evolution objectives, it has become recognized as a vital issue for businesses. To predict workforce productivity, businesses apply ML algorithms to address this issue. Businesses can take action on employee long-term planning or worker retention thanks to accurate predictions [4]. The implementation of AI has an influence on an industry's decision-taken processes in several sectors within organizations [5,6]. The caliber and talents of workers are a positive factor and a true competitive benefit for businesses, therefore HR) has received more notice recently [7].

To predict the performance in the employee dataset, this research study suggests a unique prediction model using DenseNet and ResNet50.

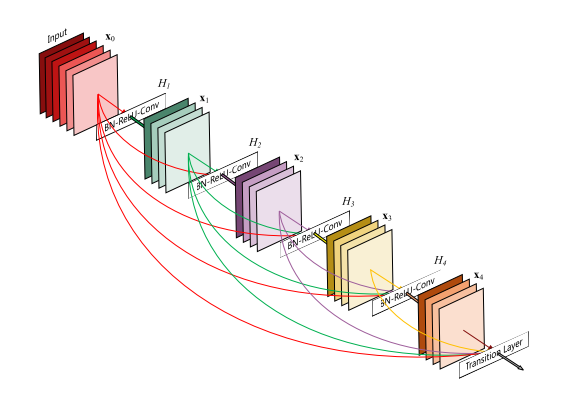
**MATERIALS AND METHODS**

This recommended research task was implemented at the DL(Deep Learning) Laboratory, Saveetha School of Engineering, SIMATS (Saveetha Institute of Medical and Technical Sciences). This developed employee prediction model consists of two types of groups Group 1 is taken as DenseNet and ResNet50 were computed many times by 150 sample sizes. After accumulating the employee dataset from an online site, repetitive and unwanted portions of the dataset were removed during the data pre-processing algorithms. Then, it is related to the relevant data sets, and the accuracy rate of the DenseNet and ResNet50 measured and compared.

The online dataset is gathered and applied in this research study on an experimental basis. It uses Python programming for making a performance prediction model in the employee dataset. Among various software tools, Python software is one of the common software for creating and evaluating the outcome of DL models. It contains a huge number of library built-in functions and different tools that are used for whole processes associated with the DL classifiers

# DenseNet

Among the most recent advancements in NN for visual image identification is DenseNet. ResNet and DenseNet are generally similar; however, there are several key distinctions. Although DenseNet appends (.) the result of the preceding stage with the result of the upcoming level, ResNet utilizes an additive approach (+) that combines the earlier level layer with the forthcoming layer[8]. Because of the great length between both the input layer and output layers and the fact that information disappears before it reaches the target, DenseNet was specifically created to increase the efficiency level in high-level NNs.[9]. Following figure 1 demonstrates the structure of the DenseNet.



Structure of the DenseNet[10]

# ResNet50

ResNet-34, a version of the initial ResNet design, included 34 weighted levels. By utilizing the idea of shortcut interconnections, it offered a creative solution for expanding the number of convolutional-type layers in a CNN model without encountering the vanishing gradient issue. A shortcut link turns a conventional model into a residual type network by "skipping over" certain levels[11]. In the majority of ResNet systems, group normalization, and dual layer bounces with non-linearity (ReLU) are employed. HighwayNet is a network that frequently uses extra weight matrices to acquire skip values. The ResNet-50 design comprises a series of averaging pooling-based convolutional units. The final level of categorization uses the Softmax method [12].

# STATISTICAL ANALYSIS

Statistical software tool IBM SPSS with the familiar version 26.0 to identify the value of SD (Standard Deviation), mean deviation data, significance point data and also drawing the graphical representations, etc. The SPSS tool was inclined in the current research process for investigating the concerned employee performance dataset. Group statistics practice and self-determining sample tests were directed at the experimental outcomes and the graphical design was created for two different graphs with two various kinds of features under the specific investigational phase.

Datasets for training and testing are preferred for the employee dataset. The training dataset is recognized by reclaiming the test dataset from the real dataset as long as 400 records as a whole.

**RESULTS**

MATLAB software tool is used to observe the employee dataset and the accuracy rate is measured among DenseNet and ResNet50 classifiers. For the given datasets, the proposed DenseNet offers more accuracy rate than the ResNet50. The accuracy value of theDenseNet and ResNet50 is illustrated in Table 3. DenseNet and ResNet50 classifier’s accuracy rates are 91.60 percent and 87.90 percent. Table 4 illustrates group statistics depending on the online employee dataset of the developed research work.

# DISCUSSION

The ResNet50 classifier is used in the earlier research work; with a mean rate value of accuracy, the rate is 87.90 %. DenseNetis developed, which has a mean accuracy value is 91.60 %.

The outcome of commercial employees is predicted by J. Yuan et al., 2022, using forecasting models built using an ML approach and large-scale organization human data. The performance forecasting model and then this strategy, according to scientific investigation, may successfully forecast employee productivity. In the meantime time, the data actual construction concentrates on data development as well as the gathering of time and attendance data. The outcomes of the research demonstrate that this kind of information may be used to correctly estimate job performance [2].

The performance of the employees identified in a business using ML was given by Riyanto Jayadi et al., 2019. It uses a data mining process that is cross-industry standard (CRIPSDM). The predictive model is developed using the NB(Naive Bayes) categorization technique. The outcome demonstrates that Nave Bayes properly identified situations in as many as 95.48 % of the cases[3].

The purpose of Keyur Patel et al., 2022 is to give an employee's overall performance according to a variety of parameters. RF (Random Forest), ANN (Artificial Neural Network), DT (Decision Tree), and XGBoost are just a few of the AI-based techniques that are initially compared. Next, incorporating all of the mentioned methodologies, they offer an ensemble method and proposed method. The research evidence shows that the suggested model is highly effective in terms of accuracy, recall, F1 measure, and correctness when compared to conventional methods like RF, ANN, DT, and XGBoost[13].

C**ONCLUSION**

The DenseNet and ResNet50 used in this study offer a better method for identifying and forecasting employee performance.

When compared to ResNet50 classifier, the recommended DenseNetgenerates a better result with an accuracy value is 91.60 percent. The necessary execution time takes place in a quicker stage of 0.5 seconds

**REFERENCES**

[1]Description: https://dl.acm.org/pb-assets/icons/DOs/default-profile-1543932446943.svgAnu Singh Lather, Ruchika Malhotra,Description: https://dl.acm.org/pb-assets/icons/DOs/default-profile-1543932446943.svg PriyaSaloni, Description: https://dl.acm.org/pb-assets/icons/DOs/default-profile-1543932446943.svgPrabhjot Singh &Sarthak Mittal(2019), "Prediction of employee performance using machine learning techniques[, AISS '19: Proceedings of the 1st International Conference on Advanced Information Science and System](https://dl.acm.org/doi/proceedings/10.1145/3373477), Article No.: 30, pp. 1–6<https://doi.org/10.1145/3373477.3373696>

[2] J. Yuan(2022), "Research on Employee Performance Prediction Based on Machine Learning," 2022 IEEE 5th International Conference on Electronics Technology (ICET), Chengdu, China, pp. 1296-1302, doi: 10.1109/ICET55676.2022.9824477.

 [3] Riyanto Jayadi, Hafizh M. Firmantyo, Muhammad T. J. Dzaka, Muhammad F. Suaidy &, Alfitra M. Putra(2019), "Employee Performance Prediction using Naïve Bayes", International Journal of Advanced Trends in Computer Science and Engineering”, Vol. 8, No.6

[4] Sohara Banu, Akhil Singh, Nipun Agarwal, Sobiya Shaik, P.Sai Nikitha (2020), “Machine learning algorithm To Predict And Improve Efficiency Of Employee Performance In Organizations”, International Journal of Advanced Research in Computer Science (IJARCS)

[5] Paschek, D, Luminosu, C & Dra, A(2017), “ Automated business process management-in times of digital transformation using machine learning or artificial intelligence. In MATEC Web of Conferences; EDP Sciences: Les Ulis, France, Vol. 121.

[6] Varian, H. Artificial Intelligence, Economics, and Industrial Organization; National Bureau of Economic Research: Cambridge, MA, USA, 2018.

[7] [Francesca Fallucchi](https://sciprofiles.com/profile/1222996), [Marco Coladangelo](https://sciprofiles.com/profile/1318420), [Romeo Giuliano](https://sciprofiles.com/profile/276318) & [Ernesto William De Luca](https://sciprofiles.com/profile/author/QjNyaTRPbXdUa3hLUjBuci9vRnh6QT09)(2020), “Predicting Employee Attrition Using Machine Learning Techniques“, MDPI *Computers, Vol*  *9*, No. 4, 86; <https://doi.org/10.3390/computers9040086>

[8] Gaurav Singhal(2020), “Introduction to DenseNet with TensorFlow “,https://www.pluralsight.com/guides/introduction-to-densenet-with-tensorflow

[9] <https://www.analyticsvidhya.com/blog/2022/03/introduction-to-densenets-dense-cnn/>

[10] <https://amaarora.github.io/2020/08/02/densenets.html>

[11] <https://datagen.tech/guides/computer-vision/resnet-50/>

[12] A. Victor Ikechukwu, S. Murali, R. Deepu, R.C. Shivamurthy (2021), “ResNet-50 vs VGG-19 vs training from scratch: A comparative analysis of the segmentation and classification of Pneumonia from chest X-ray images “, [Global Transitions Proceedings](https://www.sciencedirect.com/journal/global-transitions-proceedings)

[Vol. 2, No. 2](https://www.sciencedirect.com/journal/global-transitions-proceedings/vol/2/issue/2), pp. 375-381

[13] Patel, K., Sheth, K., Mehta, D. Tanwar, S. Florea, B.C. Taralunga, D.D. Altameem, A.; Altameem, T,& Sharma, R. RanKer: An AI-Based Employee-Performance Classification Scheme to Rank and Identify Low Performers. Mathematics, 10, 3714. https://doi.org/10.3390/ math10193714

The accuracy of Dense net is 95.8 and Restnet 50 is 87.2

