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Super Resolution CNN Algorithm to Improve The Quality Of Degraded Images.

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ABSTRACT:

Huge information carries advantages to numerous territories of logical exploration, anyway handling these a lot of information regularly requires broad registering time and a huge extra room. Super Resolution project, thinks about critical areas, and accordingly proposes another super goal approach that utilizes huge and wide-ranging data under the structure of a CNN. The preparation interaction is accomplished for the huge pieces of informational collection, reproduction cycle which are been considered critical parts independently. The focal point of Super Resolution is to create a higher goal picture from lower goal pictures.

KEYWORDS: logical exploration, High Resolution Low Resolution, convolutional Neural Network.

I. INTRODUCTION

Picture or image are defined as a point by which the light rays emerging from an object are converged or appears to be converged after reflection or refraction. It is also referred as a collection of colored points on a flat surface [1-2]. Super Resolution imaging is one of a class of technique which enables the resolution of the imaging system. Single image super resolution will always undergo a classical image restoration problem which are used to improve a high- resolution image from their equivalent low-resolution image [3-6].

A part of the image is cropped and zoomed for visualization [7-8]. The advantages are there is no need for hardware training, extensive training time and large datasets, and the limitations is it is less accurate. We will increase the quality and pixel of the images to enhance the quality of degraded images [9]. We have been suggested a deep learning technique for this single image super resolution to illustrate the traditional sparse coding-based image super-resolution [10]. Our technique rightly expands with end-to-end mapping with low- resolution and high-resolution images. The recording are predicted as a deep convolutional neural network which considers the low- resolution image as the seeding input and expects the outcome as high-resolution one. SR methods are viewed along with this DCN [11-15].

II. LITERATURE SURVEY

The convolution sparse coding method which is super resolution-based method images beyond optimization [16]. Feature extraction is done in low resolution space rather than high resolution space; the proposed system uses novel sub-pixel layer which is formulated into deep CNN. In this system SRCNN maps the images between low and high resolutions and also the pre and post processing of the for-feature extraction which will resolve LR data in the HR space with less computation time [17]. Deep Recursive Residual Network (DRRN)hear the enhanced residual unit structure which is learning of residual image between LR and HR which is done in recursive block and stack of several recursive blocks [18]. Super resolution residual network(res.Net) and SRGAN which enrages the loss of content with a loss of adversity by training a GAN. Using comprehensive testing [19-20]. The simplest ways to increase the presentation of this copies is to rise the limitations which is by growing the layers or with number of filters. Deep Resolution will eliminate redundant batch processing set of resolution and develops a multi scale super resolution network which reduces the size of the method and training database. The algorithm uses the Laplacian pyramid super resolution network (LapSRN), which has a multilevel learning strategy [21].

Table1: Literature review table

Paper Title	Advantages	Limitations
Deep learning constructed super resolution by means of substantial and general regions.	Easy to understand and implement.	The solution is dependent on big data technologies.
A Deep Neural Architecture for Image Super Resolution.	Accuracy is more compared to other Approaches.	Due to more computations their lot of Server memory is required and space Consumption is more when more datasets are loaded.
Single Image Super Resolution Based on Incoherent Dictionary Learning.	Accuracy is better due to simple relative computation on logic.	Not available as service on cloud which will be difficult to integrate over existing systems.
Numerous Sequential Regularized Exciting Learning Technologies for SISR.	No need for hardware training, extensive training time and large datasets.	Less accurate.

III. METHODOLOGY

The Research methodology mainly has 4 Modules.

A. Srcnn model

In this system we are implementing a Deep learning technique for SISR. This method is proposed for End-to-end recording, which maps between low resolution image to high resolution images. Every

image after the recording is named as convolution neural network. The performance of this technique is estimated based on the parameters Like PSNR (Peak Signal to Noise Ratio).Where MSE is the Mean Squared Error [22-27].

$$MSE = \frac{1}{mn}\sum_{i=0}^{m-1}\sum_{j=0}^{n-1}[I(i,j) - K(i,j)]^2$$

The SSIM (structural similarity index). In this module the images which we are using for training were the image undergoes the pre-process and post process where the where Y is the luminance component and Cr Cb are the colour difference so fred and blue images will be frequently converting between RGB(Red Blue Green) BGR and YCrC

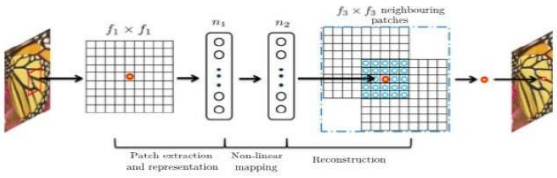


Figure1: Scrnn Architecture

B. Training and Testing

This module implements the CNN algorithm and here pyTorch libraries which are python machine learning libraries used for computer vision and NLPs, for training of the model we are using hundreds and thousands of images this high-resolution picture are then converted into low resolution image by using upscale factor library by pytorch where for ex image of 1200pixels is divided by 3 and converted into 400pixel image so that the model understands how really the low-resolution image looks like and the trained model is saved on the local disc. Instead of training the model for every image input we already load the trained model into local disc using TORCH library [28-33].

$$PSNR = 10 \cdot \log_{10}\left(\frac{MAX_I^2}{MSE}\right)$$

.

C. Web Services using REST API

Rest-ful is the software architecture which provide the interoperability between computer systems and internet and which also allows the requesting system to access [34]. Proposed system exposed the Http post API where the user can upload a low- quality image. Since this is the stateless protocol which provides the fast performance by reusing the components which can be managed without affecting the system even when it is running also. The web service implemented in the previous module. The downloaded image link will be displayed back to the client once the result is available prove the identity. Once the identity is proved the user uploads an image to the model and clicking on Run button [35-40].

D. Third party Application

In this module this third-party application which acts as user interface between the system and the user where the user should perform four basic steps to input the low-resolution Image. usage of web services to the customers, In this application, we implement four steps.

1. User should input his/her identity like first name and last name.
2. User should their contact information like phone number and emailid.
3. User should enter the one-time password which has been sent to the users contact number for security and verification process.
4. Execution with low-resolution image and downloading of high- resolution image [41].

E. Cloud based deployment

Here we are using Amazon web services for deploying this system on cloud server where people from all the regions can access it.

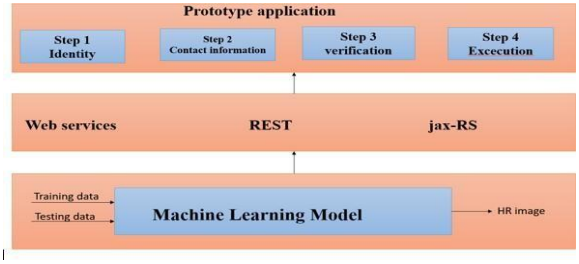
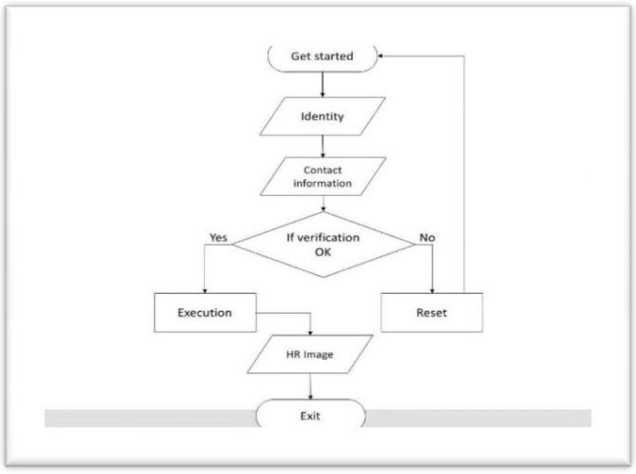


Figure2: Cloud deployment Model

In this project, the third-party applications have been implemented to demonstrate the usage of web services to the customer in this application, we implement four steps. The user has to provide the identity the first name and the last name. The user has to provide the contact information where the user has to provide emailid and mobile number of the client. Then the OTP will be sent to customer and ask them to enter it to prove the identity. Once the identity is proved, the user can give the low or degraded image as the input and the output will be as high graded or high-resolution image. The image will be obtained by running the algorithm and later the image can be downloaded back to the client.

Flow chart



IV. ADVANTAGES AND OBJECTIVES

1. Beats the disadvantages of the current explores.
2. Demonstrated High precision.
3. Memory and Time Effective.
4. Arrangement made accessible to open.

Build up a vigorous answer for re-capture a high goals picture from a low goals input. Send the super resolution convolutional neural system (SRCNN) utilizing Keras train the model against enough informational collections to keep up the precision level over 90% optimize the model to rise the exactness level much further provide information perception highlights for the clients to get progressively significant understanding of the patient well-being expose the arrangement over the cloud as an assistance with the goal that the arrangement over the cloud as an assistance with the goal that the arrangement can bere- usable by any outsider applications.

Figure3: Clarity of the image compression using CNN Model

V. CONCLUSIONSAND FUTURE WORK

The proposed work will improve the quality of the degraded images from low resolution to high resolution. We deploy the super resolution convolutional neural network (SRCNN) using keras. The main aim is it is easy to understand and implement and the limitation is the solutions is dependent on big data technologies.

FUTURE WORK

IN FUTURE, WE WORK TO EXTEND THIS ALGORITHM TO THE VIDEO FRAMES THUS IMPROVING THE RESOLUTION OF THE VIDEO FILES AS WELL.

REFERENCES

[1] Dwivedi, R., Dey, S., Chakraborty, C. and Tiwari, S., 2021. Grape disease detection network based on multi-task learning and attention features. IEEE Sensors Journal.
[2] Pavithra, G.S. and Babu, N.V., 2019. Energy efficient hierarchical clustering using HACOPSO in wireless sensor networks. International Journal of Innovative Technology and Exploring Engineering, 8(12).

[3] Vu, D.L., Nguyen, T.K., Nguyen, T.V., Nguyen, T.N., Massacci, F. and Phung, P.H., 2020. HIT4Mal: Hybrid image transformation for malware classification. Transactions on Emerging Telecommunications Technologies, 31(11), p.e3789.
[4] Lingappa, H., Suresh, H. and Manvi, S., 2018. Medical image segmentation based on extreme learning machine algorithm in kernel fuzzy c-means using artificial bee colony method. Int. J. Intell. Eng. Syst, 11, pp.128-136.

[5] PRABU, S., BALAMURUGAN, V. AND VENGATESAN, K., 2019. DESIGN OF COGNITIVE IMAGE FILTERS FOR SUPPRESSION OF NOISE LEVEL IN MEDICAL IMAGES. MEASUREMENT, 141, PP.296-301.

[6] L. Tan, N. Shi, K. Yu, M. Aloqaily, Y. Jararweh, "A Blockchain-Empowered Access Control Framework for Smart Devices in Green Internet of Things", ACM Transactions on Internet Technology, vol. 21, no. 3, pp. 1-20, 2021,https://doi.org/10.1145/3433542.
[7] Z. Guo, A. K. Bashir, K. Yu, J. C. Lin, Y. Shen, "Graph Embedding-based Intelligent Industrial Decision for Complex Sewage Treatment Processes", International Journal of Intelligent Systems, 2021, doi: 10.1002/int.22540.
[8] Z. Guo, K. Yu, A. Jolfaei, A. K. Bashir, A. O. Almagrabi, and N. Kumar, "A Fuzzy Detection System for Rumors through Explainable Adaptive Learning", IEEE Transactions on Fuzzy Systems, doi: 10.1109/TFUZZ.2021.3052109.
[9] K. Yu, L. Lin, M. Alazab, L. Tan, B. Gu, "Deep Learning-Based Traffic Safety Solution for a Mixture of Autonomous and Manual Vehicles in a 5G-Enabled Intelligent Transportation System", IEEE Transactions on Intelligent Transportation Systems, doi: 10.1109/TITS.2020.3042504.
[10] K. Yu, M. Arifuzzaman, Z. Wen, D. Zhang and T. Sato, "A Key Management Scheme for Secure Communications of Information Centric Advanced Metering Infrastructure in Smart Grid," IEEE Transactions on Instrumentation and Measurement, vol. 64, no. 8, pp. 2072-2085, August 2015.
[11] K. Yu, L. Tan, X. Shang, J. Huang, G. Srivastava and P. Chatterjee, "Efficient and Privacy-Preserving Medical Research Support Platform Against COVID-19: A Blockchain-Based Approach", IEEE Consumer Electronics Magazine, doi: 10.1109/MCE.2020.3035520.
[12] Subramani, Prabu, K. Srinivas, R. Sujatha, and B. D. Parameshachari. "Prediction of muscular paralysis disease based on hybrid feature extraction with machine learning technique for COVID-19 and post-COVID-19 patients." Personal and Ubiquitous Computing (2021): 1-14.
[13] Nguyen, Ngoc-Tu, Ming C. Leu, and Xiaoqing Frank Liu. "RTEthernet: Real-time communication for manufacturing cyberphysical systems." Transactions on Emerging Telecommunications Technologies 29, no. 7 (2018): e3433.

[14] HEMALATHA, K. L., S. M. ASHITHA, AND S. R. MEGHANA. "DESIGN AND IMPLEMENTATION OF MODIFIED FCM IN THE DETECTION OF BRAIN TUMOR." INT. J. ADV. SCI. RES. ENG 3, NO. 4 (2017): 2850-2858

[15] RAJENDRAKUMAR, SHINY, V. K. PARVATI, B. D. PARAMESHACHARI, KM SUNJIV SOYJAUDAH,AND RESHMA BANU. "AN INTELLIGENT REPORT GENERATOR FOR EFFICIENT FARMING." IN 2017 INTERNATIONAL CONFERENCE ON ELECTRICAL, ELECTRONICS, COMMUNICATION, COMPUTER, AND OPTIMIZATION TECHNIQUES (ICEECCOT), PP. 1-5. IEEE, 2017.

[16] Title: Image Super Resolution Using Deep Convolutional Networks[J]. IEEE Transactions on Pattern Analysis & Machine Intelligence. DongC, Chen CL, HeK,etal.2016.
[17] Title: Real-Time Single Image and Video Super-Resolution Using an Efficient Sub-Pixel Convolutional Neural Network[J] ShiW,CaballeroJ,HuszarF,etal2016.
[18] Title: Image Super-Resolution via Deep Recursive Residual Network[C], IEEE Computer Vision and Pattern Recognition.TaiY,YangJ,LiuX.2017.

[19] Title: Image Super-Resolution via Deep Recursive Residual Network[C],Title: Photo-Realistic Single Image Super-Resolution Using a Generative Adversarial Network[J]. LedigC, Theis L,HuszarF, et al.2015.
[20] Kim J, Lee JK, Lee KM. Accurate Image Super Resolution Using Very Deep Convolutional Networks[C]. computer vision and pattern recognition. IEEE 2016:1646-1654.
[21] SYang,J.,Wright,J.,Huang,T.S.,et al.:'Image super-resolution via sparse representation'. IEEE Transactionson Image Processing A Publication of the IEEESignalProcessingSociety,2010, 19, (11), pp.2861-2873.
[22]Muhammad, L.J., Algehyne, E.A., Usman, S.S., Ahmad, A., Chakraborty, C. and Mohammed, I.A., 2021. Supervised machine learning models for prediction of COVID-19 infection using epidemiology dataset. SN computer science, 2(1), pp.1-13.
[23]Parameshachari, B.D., Panduranga, H.T. and liberata Ullo, S., 2020, September. Analysis and Computation of Encryption Technique to Enhance Security of Medical Images. In IOP Conference Series: Materials Science and Engineering (Vol. 925, No. 1, p. 012028). IOP Publishing.
[24] Ngo, T.D., Bui, T.T., Pham, T.M., Thai, H.T., Nguyen, G.L. and Nguyen, T.N., 2021. Image deconvolution for optical small satellite with deep learning and real-time GPU acceleration. Journal of Real-Time Image Processing, pp.1-14.
[25] Babu, R.G., Maheswari, K.U., Zarro, C., Parameshachari, B.D. and Ullo, S.L., 2020. Land-Use and Land-Cover Classification Using a Human Group-Based Particle Swarm Optimization Algorithm with an LSTM Classifier on Hybrid Pre-Processing Remote-Sensing Images. Remote Sensing, 12(24), p.4135.
[26] Nguyen, Tu N., Bing-Hong Liu, and Shih-Yuan Wang. "On new approaches of maximum weighted target coverage and sensor connectivity: Hardness and approximation." IEEE Transactions on Network Science and Engineering 7, no. 3 (2019): 1736-1751.
[27] Rajendrakumar, Shiny, and V. K. Parvati. "Automation of irrigation system through embedded computing technology." In Proceedings of the 3rd International Conference on Cryptography, Security and Privacy, pp. 289-293. 2019.
[28] Subramani, Prabu, Fadi Al-Turjman, Rajagopal Kumar, Anusha Kannan, and Anand Loganthan. "Improving medical communication process using recurrent networks and wearable antenna s11 variation with harmonic suppressions." Personal and Ubiquitous Computing (2021): 1-13.
[29] Bhuvaneswary, N., S. Prabu, S. Karthikeyan, R. Kathirvel, and T. Saraswathi. "Low Power Reversible Parallel and Serial Binary Adder/Subtractor." Further Advances in Internet of Things in Biomedical and Cyber Physical Systems (2021): 151.
[30] Le, Ngoc Tuyen, Jing-Wein Wang, Duc Huy Le, Chih-Chiang Wang, and Tu N. Nguyen. "Fingerprint enhancement based on tensor of wavelet subbands for classification." IEEE Access 8 (2020): 6602-6615.
[31] Manjanaik, N., B. D. Parameshachari, S. N. Hanumanthappa, and Reshma Banu. "Intra Frame Coding In Advanced Video Coding Standard (H. 264) to Obtain Consistent PSNR and Reduce Bit Rate for Diagonal Down Left Mode Using Gaussian Pulse." In IOP Conference Series: Materials Science and Engineering, vol. 225, no. 1, p. 012209. IOP Publishing, 2017.
[32] Pham, Dung V., Giang L. Nguyen, Tu N. Nguyen, Canh V. Pham, and Anh V. Nguyen. "Multi-topic misinformation blocking with budget constraint on online social networks." IEEE Access 8 (2020): 78879-78889.
[33] Nayak, Jithendra PR, K. Anitha, B. D. Parameshachari, Reshma Banu, and P. Rashmi. "PCB Fault detection using Image processing." In IOP Conference Series: Materials Science and Engineering, vol. 225, no. 1, p. 012244. IOP Publishing, 2017.
[34] Nguyen, Tu N., Bing-Hong Liu, Nam P. Nguyen, and Jung-Te Chou. "Cyber security of smart grid: attacks and defenses." In ICC 2020-2020 IEEE International Conference on Communications (ICC), pp. 1-6. IEEE, 2020.

[35] Y. Gong, L. Zhang, R. Liu, K. Yu and G. Srivastava, "Nonlinear MIMO for Industrial Internet of Things in Cyber–Physical Systems," IEEE Transactions on Industrial Informatics, vol. 17, no. 8, pp. 5533-5541, Aug. 2021, doi: 10.1109/TII.2020.3024631.
[36] C. Feng, K. Yu, M. Aloqaily, M. Alazab, Z. Lv and S. Mumtaz, "Attribute-Based Encryption with Parallel Outsourced Decryption for Edge Intelligent IoV," IEEE Transactions on Vehicular Technology, vol. 69, no. 11, pp. 13784-13795, Nov. 2020, doi: 10.1109/TVT.2020.3027568.
[37] Parameshachari, B. D., H. T. Panduranga, and Silvia liberata Ullo. "Analysis and computation of encryption technique to enhance security of medical images." In IOP Conference Series: Materials Science and Engineering, vol. 925, no. 1, p. 012028. IOP Publishing, 2020.
[38] Nguyen, Ngoc-Tu, Bing-Hong Liu, Shao-I. Chu, and Hao-Zhe Weng. "Challenges, designs, and performances of a distributed algorithm for minimum-latency of data-aggregation in multi-channel WSNs." IEEE Transactions on Network and Service Management 16, no. 1 (2018): 192-205.
[39] Rajendran, Ganesh B., Uma M. Kumarasamy, Chiara Zarro, Parameshachari B. Divakarachari, and Silvia L. Ullo. "Land-use and land-cover classification using a human group-based particle swarm optimization algorithm with an LSTM Classifier on hybrid pre-processing remote-sensing images." Remote Sensing 12, no. 24 (2020): 4135.
[40]. S. Chen, L. Zhang, Y. Tang, C. Shen, R. Kumar, K. Yu, U. Tariq, and A. K. Bashir, “Indoor Temperature Monitoring Using Wireless Sensor Networks: A SMAC Application in Smart Cities”, Sustainable Cities and Society, vol. 61, p. 102333, July 2020.
[41] Hemalatha, K. L., SUNILKUMAR MANVI, and HN SURESH. "ADAPTIVE WEIGHTED-COVARIANCE REGULARIZED KERNEL FUZZY C MEANS ALGORITHM FOR MEDICAL IMAGE SEGMENTATION." Journal of Theoretical & Applied Information Technology 95, no. 14 (2017).