

THE 23rd INTERNATIONAL CONFERENCE ON COMPUTER AND INFORMATION TECHNOLOGY

Autonomous Deblurring Images and Information Extraction from Documents Using CycleGAN and Mask RCNN

Oishee Bintey Hoque, Maisha Binte Rashid, K M Tawsik Jawad

Department of CSE, Ahsanullah University of Science and Technology



Problem Overview

An important document may get blur during scanning or other reasons.

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Problem Overview

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International Conference on Innovation in Engineering and Technology(ICIET) 2018

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Problem Overview

Also, autonomous information extraction is one of the most needed feature in this era.

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Paper Overview

Our work focuses on two problems:

⊙To deblur an image

⊙To extract information

⊙To be more specific, we only focus on every type of ADMISSION FORMS.



Research Domain



Research Problem

SImage Deblurring

⊙ Among, so many options, we chose the most recent CycleGAN Approach.

OInformation Extraction

- Using **Deep Learning** based object detection method
- S Using OCR Library



Related Works



Existing Works

To best of our knowledge -

- Rasmus Berg Palm et al. 2017
 - "Cloudscan A configuration free invoice analysis system using recurrent neural net-works"
- Radford et al. 2015
 - "Unsupervised Representation Learning With Deep Convolutional Generative Adversarial Networks"
- Sharma et al. 2018
 - "Learning to clean: A GAN perspective"
- Sun et al. 2019
 - "Template matching-based method for intelligent invoice information identification"
- Zhu et al. 2017
 - "Unpaired image-to-image translation using cycle-consistent adversarial networks"



Reviews

- Additional device for input
- Dataset
 - Requires increment in volume
 - Variation in document types would allow the model to extract information from all kinds of documents
- Methodology
 - Gaussian, Stack, Motion Blur application with random probabilities in pre-processing
 - Training using Mask R-CNN on cleaned dataset prepared by Cycle GAN
- Output
 - Handwriting recognition not robust enough from Tesseract
 - Performance limited to form type documents.



Contribution

Domain	Our Contribution	
	Open Source	\checkmark
Dataset	Robust	\checkmark
	Proper Variation	\checkmark
Our Sustan	Device Independent	\checkmark
Our System	Real Time	\checkmark



Methodology (Cycle GAN)



Sasic Concepts

⊙Unpaired image-to-image Translation

Senerator

- S Encoder (Extract the feature) S Encoder (Extract the feature)
- ⊙ Transformer (Add the previous result)
- S Decoder (Decode the result)





⊙Basic Concepts

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⊙ Take images and try to predict if it's real or fake

























Methodology (Mask RCNN)























flatten images



Our Dataset

We employ two types of document datasets:
 The first one for background noise removal
 The other one for information extraction with bounding boxes.



SWe utilize the internet as the primary source to collect several types of documents admission form, NID form, etc. to keep variation in our dataset.

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SLater, each image goes through three types of blurring, i.e., stack blur, gaussian blur, and motion blur.



SThese procedures are randomly applied to images based on some random probability, radius, kernel size, and standard deviation.

- SFrom each image, we generated additional ten images and manually filtered the dataset.
- Sinally, our dataset consisted of 1000 images in total, split into 8:2 ratio as a training and validation set.
- Sor further evaluation, we collected additional 20 images to check our model's accuracy on the real noisy dataset







⊙Two types of bounding boxes –

⊙One for the label field name and

⊙Another for corresponding field information.

Some hundred images consist of over 10,000 bounding boxes for each field.

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Sinally, our dataset consisted of 2000 copies in total, split into 8:2 ratio as a training and validation set.



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Experimental Result

Peak Signal-to-Noise Ratio(PSNR) of CycleGAN obtains 31.334dB.
Average Precision with IoU = [.5,.75]. We get 75.8 and 60.1
Accuracy Rate on Mask RCNN = 98.20%.



Experimental Result

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Blurred Image





Experimental Result





Limitations

Our System is only limited to Admission Forms.



Future Plan

SMobile Version







Future Plan

SUser friendly system – Mobile Integration
 Increasing dataset and scope of our work
 Evaluating the performance of our system on all kinds of documents

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Thank You Any Questions?

