

# **B.TECH PROJECT FINAL REPORT**

**Title of the Project :** Document Image Analysis

**Team Members :**

- 1) Guvvala Sujitha (B19EE033)
- 2) Gattu Hemanth (B19EE030)

**Name of the Supervisor :** Dr. Gaurav Harit

## **Abstract:**

Document image analysis refers to the algorithms and techniques used to extract a computer readable description from pixel data in document images. Optical Character Recognition (OCR) is the process of detecting and reading text in images through computer vision. OCR can predict the output accurately and that too in a matter of milliseconds. OCR is one of the first problems addressed in computer vision and has seen tremendous development. By the help of these OCR models we have proposed a solution for detecting the labels of the invoices to achieve a high level of accuracy, we have used ensemble technique in which we have used different OCRs for detection and recognition separately.

## **Motivation :**

In the past the prevalence of fast computers, large computer memory, and inexpensive scanners fostered an increasing interest in document image analysis. With many paper documents being sent and received via fax machines and being stored digitally in large document databases, the interest grew to do more with these images than simply view and print them. Just as humans extract information from these images, research was performed and commercial systems built to read text on a page, to find fields on a form, and to locate lines and symbols on a diagram. Today, the results of

research work in document processing and optical character recognition (OCR) can be seen and felt every day. With this motivation our goal is to detect the important labels of an invoice image such as: Vendor's Name, Bill Date, Bill Number, Bill Amount, Total Number of Items for each invoice of different companies.

## **Methodology :**

### **Basic Architecture:**



Coming to the basic architecture, we have:

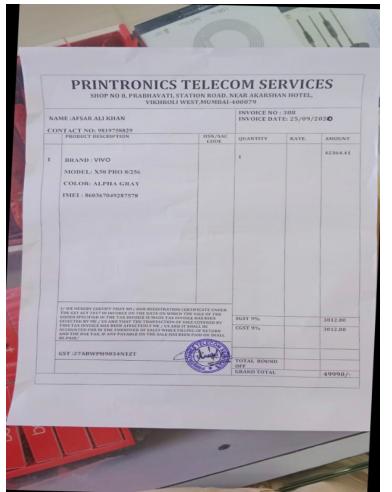
- We have a template dataset with label names for several templates, including Vendor's Name, Bill Date, Bill Number, Bill Amount, and Total Number of Items. Preprocessing of the invoice is done and a MultiOcr model is then developed in order to get the coordinates of the labels for each invoice template. The OCR

model works in two steps one is detection which identifies “*where*” the text is present, i.e., detects the coordinates of the text in the invoice and the other is Recognition which recognizes “*what*” is the text, i.e, as the name suggests, it recognizes/predicts the text present within the coordinates.

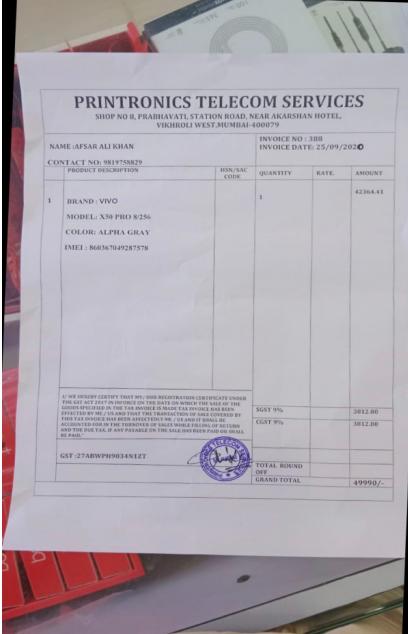
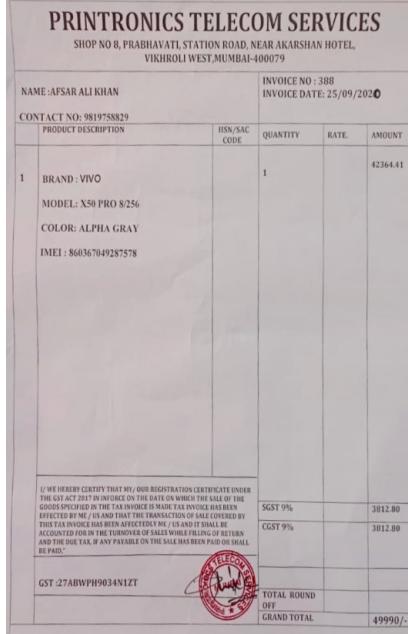
- Each template's coordinates for these labels are stored in a table.
- Layout mapping is carried out to get the invoice image template in order to detect the labels for new invoices.
- Following the detection of the template, the coordinates of the labels included in the table were retrieved.
- The labels prediction for the invoice is done using the extracted coordinates

### Image Preprocessing :

➤ **Skew Correction :** While processing a document, it might be slightly skewed (image aligned at a certain angle with horizontal). Skew Correction is for detecting & correcting the skew

Input	Output
	

➤ **Contour Detection:** Because the images we have contain invoices in various positions, we must locate the invoice in the image. This was accomplished through the use of contour detection. Finding the largest contour, cropping the image to fit, and presenting it. Using the cv2.findContours() function to find the contours and the cv2.contourArea() method to detect the greatest contour and cropping the image to that contour, this was accomplished.

Input	Output
	

➤ **Binarisation :**Binarization is done for segmenting the document into foreground text and background. Binarization is the process of converting a coloured image into an image that only contains black and white pixels by using a specific threshold. The Adaptive Thresholding approach is utilized, which determines a threshold for a tiny portion of the image based on its locality and neighbors.

Input	Output
<p>The input image shows a standard GST invoice from Printronics Telecom Services. It details a single purchase of a VIVO X50 Pro 8/256 smartphone. The total amount is 49990/-.</p>	<p>The output image shows the same GST invoice as the input, but with a vertical blur effect applied across the entire document. This simulates the effect of noise filtering on the original image.</p>

➤ **Noise Filtering :** Noise filtering is used to smoothen images by removing small dots/patches that are brighter than the rest of the image. The OpenCV fastNIMeansDenoisingColored function is used to accomplish this.

Input	Output
<p>The input image shows a standard GST invoice from Printronics Telecom Services. It details a single purchase of a VIVO X50 Pro 8/256 smartphone. The total amount is 49990/-.</p>	<p>The output image shows the same GST invoice as the input, but with the vertical blur effect removed. This demonstrates the effectiveness of the noise filtering process in smoothing the image.</p>

## Label Extraction and Mapping for Template Images :

- Template dataset is created which consists of labels names of each template invoice as shown below:

Invoice File Name	Vendor's Name	Bill Date	Bill Amount	Bill Number	Table_Initial	Table_Final
bill1.jpg	M/s AHUJA MEDICINE CENTRE	10-04-2004	4124	36	Amount	Sub Total
bill2.jpg	ZYLKAR CORPORATION	May 8, 2015	270.00	#00121	Amount	Total
customising-your-tax-invoices.png	Zylker India	13 Apr 2017	590	INV-000015	Amount	HSN
GST_Invoice_Template_1d797c2a14.png	FOOBAR LABS	Feb 19,2020	42,485	3	Total	Sub Total
img20220623104035 (1).jpg	PRINCE FOOT WEAR	19/06/2022	1740	2230060	Net price	Total Amount
IN-564x1038.png	ABC Seller	May 27th, 2020	48,557.00	12345	Subtotal	Invoice Summary
Invoice_4552-1.jpg	GUJARAT FREIGHT TOOLS	20-Mar-2020	38	4552	No.	Total
law-firm-invoice-template-indian-inr-currency.png	Law Firm/Law Office Name		22,500.00		Line Total	Sub Total
qqZsL14.png	Kantech Solutions Private Limited	14/07/2017	1,57,500.00	1	Amount	Sub Total
Template1-1.jpg	GUJARAT FREIGHT TOOLS	19-Mar-2023	1,258.00	GST112020	No.	Total

- The MultiOcr model is then developed in order to get the coordinates of the labels for each invoice template. The OCR model works in two steps one is detection which identifies “where” the text is present, i.e., detects the coordinates of the text in the invoice and the other is Recognition which recognizes “what” is the text, i.e, as the name suggests, it recognizes/predicts the text present within the coordinates. Used easyOCR as detection model and PaddleOCR as recognition model .

### Example Template :

GUJARAT FREIGHT TOOLS						
Manufacturing & Supply of Precision Press Tool & Room Component						
64, Akshay Industrial Estate Near New Cloth Market, Ahmedabad - 38562			Tel: 079-2582009 Web : www.gftools.com Email: info@gftools.com	LOGOTEXT SOLUTIONS		
GSTIN : 24HDE7497RESRT4						
Customer Detail			TAX INVOICE		ORIGINAL FOR RECIPIENT	
<p>M/S Kevin Motors Address: Chandni Chok, New Delhi, Opposite Statue, New Delhi, Delhi - 110014 PHONE: 9311111111 GSTIN: 07AQLCC120601ZG Place of Supply: Delhi (07)</p>			Invoice No.: GST112020	Invoice Date: 04-Mar-2020	Challan Date: 03-Mar-2020	
			P.O. No.: 56	P.O. No.: 56	DELIVERY DATE: 04-Mar-2020	Reverse Charge: No
			P.O. No.: 56	L.R. No.: 958	Due Date: 19-Mar-2020	E-Way No.: EWBS54864584
Sr. No.	Name of Product / Service	HSN / SAC	Qty	Rate	Taxable Value	
1	Automatic Saw	8202	1.00 PCS	586.00	586.00	
2	Stanley Hammer Claw Hammer Steel Shaft (Black and Chrome)	8205	1.00 PCS	568.00	568.00	
					%	Amount
					9.00	52.74
						638.74
					Total	1,258.00
					Total	1,258.00
Total in words			Taxable Amount 1,154.00			
ONE THOUSAND TWO HUNDRED AND FIFTY-EIGHT RUPEES ONLY			Add : IGST 103.86			
			Total Tax 103.86			
			Total Amount After Tax ₹ 1,258.00 (E & O.E.)			
Bank Details			GST Payable on Reverse Charge N.A.			
Bank Name: State Bank of India Branch Name: RAF CAMP Bank Account Number: 2000000004512 Bank Branch IFSC: SBIN0000458			Certified that the particulars given above are true and correct. For Gujarat Freight Tools			
Terms and Conditions			This is computer generated Invoice no signature required.			
1. Subject to Ahmedabad Jurisdiction. 2. Our liability ends when the goods leave our premises. 3. Goods once sold will not be taken back. 4. Delivery ex-premises.			Authorised Signatory			

As we pass the template to MultiOCR model we get the coordinates of text present in the invoice as follows :

```
[13, 968, 5, 77]: GUJARAT FREIGHT TOOLS
[13, 1122, 89, 140]: Manufacturing & Supply of Precision Press Tool & Room Component
[16, 412, 159, 200]: 64, Akshay Industrial Estate
[872, 927, 161, 190]: Tel :
[928, 1118, 157, 194]: 079-25820309
[18, 376, 203, 240]: Near New Cloath Market,
[802, 1118, 195, 243]: Web : www.gftools.com
[1190, 1424, 196, 241]: LOGOTEXT
[19, 196, 247, 278]: Ahmedabad
[214, 303, 246, 278]: 38562
[762, 1116, 245, 282]: Email : info@gftools.com
[1206, 1410, 239, 266]: SLOGANHERE
[8, 435, 300, 341]: GSTIN : 24HDE7487RE5RT4
[603, 860, 298, 342]: TAX INVOICE
[1168, 1445, 307, 333]: ORIGINAL FOR RECIPIENT
[217, 370, 356, 377]: Customer Detail
[594, 709, 357, 381]: Invoice No
[830, 970, 355, 383]: GST112020
[1081, 1214, 357, 383]: Invoice Date
[1298, 1435, 357, 383]: 04-Mar-2020
[11, 58, 395, 421]: M/S
[139, 278, 395, 421]: Kevin Motors
[595, 717, 402, 429]: Challan No.
[830, 876, 404, 429]: 865
[1083, 1217, 402, 429]: Challan Date
[1298, 1435, 404, 429]: 03-Mar-2020
[9, 101, 432, 458]: Address
[139, 513, 431, 463]: Chandani Chok, New Delhi, Opposite
[595, 684, 449, 475]: P.O. No.
[830, 862, 449, 474]: 66
[138, 493, 457, 488]: Statue, New Delhiq, Delhi - 110014
[9, 91, 497, 523]: PHONE
[139, 275, 497, 523]: 9372346666
[595, 766, 495, 521]: DELIVERY DATE
[830, 967, 494, 521]: 04-Mar-2020
[1082, 1251, 491, 527]: Reverse Charge
[1000, 1222, 406, 510]:
```

From these coordinates we get the coordinates of required labels as shown below:

```
[['Template1-1.jpg'],
 [13, 968, 5, 77],
 [1298, 1435, 357, 383],
 [1303, 1450, 1711, 1743],
 [830, 970, 355, 383],
 [1191, 1261, 719, 740],
 [560, 611, 1512, 1532]]
```

- The coordinates of label names present in the template dataset for each template invoice are identified using the **MultiOcr model** and stored in a table (csv file).

File_Name	vendor_name	Bill_Number	Bill_Date	Bill_Amount	Coord_In	Coord_Final
[bill2.jpg]	[42, 290, 51, 78]	[304, 355, 292, 309]	[635, 695, 603, 619]	[647, 698, 75, 91]	[593, 640, 224, 233]	[459, 522, 600, 614]
[bill1.jpg]	[128, 500, 2, 28]	[408, 501, 132, 146]	[477, 541, 196, 211]	[591, 635, 688, 702]	[637, 694, 345, 361]	[43, 87, 619, 634]
[customising-your-tax-invoices.jpg]	[136, 284, 110, 146]	[156, 279, 671, 700]	[1263, 1364, 1095, 1120]	[1065, 1384, 232, 269]	[1270, 1348, 763, 788]	[190, 361, 908, 945]
[img20220623104035 (1).jpg]	[598, 1845, 441, 600]	[1490, 2266, 1408, 1513]	[1580, 2176, 2768, 2945]	[430, 981, 1400, 1540]	[1653, 2164, 1616, 1716]	[87, 1371, 2776, 2965]
[IN-564x1038.jpg]	[39, 115, 124, 141]	[38, 201, 269, 287]	[463, 537, 976, 990]	[39, 147, 249, 263]	[470, 517, 308, 317]	[369, 472, 641, 660]
[Invoice_4552-1.jpg]	[13, 968, 3, 78]	[1299, 1436, 495, 521]	[1311, 1449, 1523, 1552]	[830, 894, 356, 384]	[13, 46, 849, 869]	[822, 875, 1448, 1472]
[qoZsL4.jpg]	[37, 233, 112, 126]	[470, 536, 129, 145]	[697, 766, 456, 471]	[470, 536, 129, 145]	[719, 767, 271, 285]	[617, 670, 372, 386]
[Template1-1.jpg]	[13, 968, 5, 77]	[1298, 1435, 357, 383]	[1303, 1450, 1711, 1743]	[830, 970, 355, 383]	[1191, 1261, 719, 740]	[560, 611, 1512, 1532]

- The starting and ending coordinates of the table present in the invoice image were given to predict the number of items present in the invoice because the number of items can vary between invoices.
- For labels like total amount, the position of which changes as the size of the table in the invoice image changes. To address this issue, a relative positioning method for predicting the total amount label was implemented. This was accomplished by predicting the coordinates of the strings surrounding the total amount label present in the invoice. This is done because the value of the string does not change even if the invoices are different but from the same template.

### **Layout Mapping :**

- We need to know the invoice template in order to extract the labels from new invoices. The document similarity method is designed to predict the invoice template.
- Document similarity, as the name implies, determines how similar two documents are. Document distance is used to calculate document similarity. Document distance is a concept in which words (documents) are treated as vectors and the angle between two given document vectors is calculated. The frequency of occurrences of words in a given document is represented by document vectors.
- We were able to obtain the template of the invoice whose labels are to be predicted using this method.

## Example:

 <p><b>Tax Invoice/Bill of Supply/Cash Memo</b> (Original for Recipient)</p> <p>Sold By: District9 1/22 Ground Floor, TIL COMPOUND, SITE 4 SAHARASAD GHAZIABAD, UTTAR PRADESH, 201010 IN</p> <p>PAN No: AAMFD178SD GST Registration No: 09AAMFD178SD1ZB</p> <p>Order Number: 767-2147227-5682290 Order Date: 04.09.2017</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Unit Price</th> <th>Quantity</th> <th>Net Amount</th> <th>Tax</th> <th>Total Amount</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Tribes: We Need You To Lead Us - H-Cardcover MSLMULJWMP</td> <td>Rs 1074</td> <td>1</td> <td>Rs 1074</td> <td>10% GST Rs 193.39s</td> <td>Rs 1267.3</td> </tr> <tr> <td><b>TOTAL:</b></td> <td></td> <td></td> <td></td> <td><b>Rs. 1093.3</b></td> <td><b>Rs. 1267.3</b></td> <td></td> </tr> </tbody> </table> <p>Invoice Number: IN-5576 Invoice Details: UP-16223569-6767 Invoice Date: 05.09.2017</p> <p>Amount in Words: One Thousand Two Hundred Sixty Seven Only</p> <p>For District9: </p> <p>Authorized Signatory</p>	Sl. No.	Description	Unit Price	Quantity	Net Amount	Tax	Total Amount	1	Tribes: We Need You To Lead Us - H-Cardcover MSLMULJWMP	Rs 1074	1	Rs 1074	10% GST Rs 193.39s	Rs 1267.3	<b>TOTAL:</b>				<b>Rs. 1093.3</b>	<b>Rs. 1267.3</b>		 <p><b>Tax Invoice/Bill of Supply/Cash Memo</b> (Original for Recipient)</p> <p>Sold By : Repro Knowledgecast Ltd * Khasra no 1319.22.172/9/1, Village Malpura, Tehsil Dhanurha, Rewari, Haryana, 123110 IN</p> <p>PAN No: AAECR4557N GST Registration No: NotApplicable</p> <p>Order Number: 171-3221157-8669140 Order Date: 15.10.2019</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>Unit Price</th> <th>Quantity</th> <th>Net Amount</th> <th>Tax</th> <th>Total Amount</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Cracking the Coding Interview: 189 Programming Questions and Solutions   0984782850 ( RKCC000361444 )</td> <td>Rs3999</td> <td>1</td> <td>Rs3999.0</td> <td>0% GST</td> <td>Rs3999.0</td> </tr> <tr> <td><b>Shipping Charges</b></td> <td></td> <td></td> <td></td> <td><b>Rs13.33</b></td> <td><b>-Rs13.33</b></td> <td></td> </tr> <tr> <td><b>TOTAL:</b></td> <td></td> <td></td> <td></td> <td><b>Rs3999.0</b></td> <td><b>Rs3999.0</b></td> <td></td> </tr> </tbody> </table> <p>Amount in Words: Three Thousands and Nine Hundred And Ninety-nine only</p> <p>For Repro Knowledgecast Ltd: </p> <p>Whether tax is payable under reverse charge - No</p>	Sl. No.	Description	Unit Price	Quantity	Net Amount	Tax	Total Amount	1	Cracking the Coding Interview: 189 Programming Questions and Solutions   0984782850 ( RKCC000361444 )	Rs3999	1	Rs3999.0	0% GST	Rs3999.0	<b>Shipping Charges</b>				<b>Rs13.33</b>	<b>-Rs13.33</b>		<b>TOTAL:</b>				<b>Rs3999.0</b>	<b>Rs3999.0</b>	
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Img1 :

Img2 :

 <p>Contact us: 1800 208 9898    cs@flipkart.com Kitchengiftonline.com, Storehouse Address: Kharita No. 453, Road No. 64, Lajpat Nagar, New Delhi, Delhi, India - 110077</p> <p>Order ID: OD302291403615833200 Order Date: 11-05-2015 Invoice Date: 11-03-2015 VAT/TIN: 07766965288 GST #: VF06467</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Product</th> <th>Title</th> <th>Qty</th> <th>Price (₹)</th> <th>Tax (₹)</th> <th>Total (₹)</th> </tr> </thead> <tbody> <tr> <td>Pop-up Toasters FSN: PUTDYCZDINVXZRQ6 WID: VF06467</td> <td>Philips HD4815/01 800 W Pop Up Toaster J2594 C2F</td> <td>1</td> <td>1031.11</td> <td>128.89</td> <td>1160.00</td> </tr> <tr> <td><b>Total</b></td> <td><b>1</b></td> <td><b>1031.11</b></td> <td><b>128.89</b></td> <td><b>1160.00</b></td> <td></td> </tr> <tr> <td colspan="6"><b>Grand Total</b>      ₹ 1160.00</td> </tr> </tbody> </table> <p>This is a computer generated invoice. No signature required.</p>	Product	Title	Qty	Price (₹)	Tax (₹)	Total (₹)	Pop-up Toasters FSN: PUTDYCZDINVXZRQ6 WID: VF06467	Philips HD4815/01 800 W Pop Up Toaster J2594 C2F	1	1031.11	128.89	1160.00	<b>Total</b>	<b>1</b>	<b>1031.11</b>	<b>128.89</b>	<b>1160.00</b>		<b>Grand Total</b> ₹ 1160.00						<p><b>Tax Invoice # DEL-000078-00015191</b></p> <p>Shipping Address Mr. John Hussain Technical Assistant/computer/institute of Mathematical SciencesIV Cross Road, CIT CampusTaramani,. cheenai 600013 Tamil Nadu Phone: 9854856897</p> <p>*This invoice and manufacture box for warranty purposes.</p>
Product	Title	Qty	Price (₹)	Tax (₹)	Total (₹)																				
Pop-up Toasters FSN: PUTDYCZDINVXZRQ6 WID: VF06467	Philips HD4815/01 800 W Pop Up Toaster J2594 C2F	1	1031.11	128.89	1160.00																				
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<b>Grand Total</b> ₹ 1160.00																									

**Returns Policy:** At Flipkart we try to deliver perfectly each and every time. But in the off-chance that you need to return the item, please do so with the original Brand box/price tag, original packing and invoice - without which it will be really difficult for us to act on your request. Please help us in helping you. Terms and conditions apply.

The goods sold as part of this shipment are intended for end user consumption / retail sale and not for re-sale.  
Regd. office: Kitchengiftonline.com, 307 Block Ward No.6, Akshardham, NEW DELHI, DELHI - 110060

PL: F81178936 | T: 2 | Pack: BX | S: S86610761 | page 1 of 1

Img3:

We used the document similarity method upon those three images, where img1 and img2 are from the same vendor and img3 is from a different vendor, and the document similarity results are shown below:

img1-img2: The distance is: 1.000072 (radians)

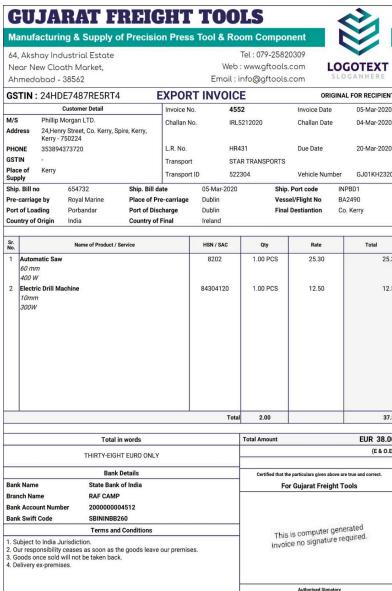
img1-img3 : The distance is: 1.408562 (radians)

img2-img3 : The distance is: 1.398076 (radians)

From the results of the document similarity method we can see that the distance of img1 and img2 is lower than the rest combinations this implies that the image img1 and img2 are from the same vendor

## Labels Prediction :

- We obtained the template. Label coordinates are extracted from the table (csv file) and used to detect invoice image labels.

Input		Output	
 <p>The input image shows a standard export invoice template for Gujarat Freight Tools. It includes sections for company details, shipping information, product details, and payment terms. The data is filled in with specific values like 'GUJARAT FREIGHT TOOLS' as the company name, '24/Hour 7x24' as the service, and various shipping details. The table structure is consistent with the output image.</p>		 <p>The output image shows the same invoice template as the input, but with several fields redacted using a red rectangular box. These redacted fields likely correspond to the labels identified in the input image, such as shipping addresses, product descriptions, and payment terms.</p>	

## Results and Discussion:

INVOICE					
Invoice# INV-000015					
<b>Zylker India</b> 5 Tadong Road Gangtok 737102 India					
GSTIN 33GSPTN0371G1ZD					
Bill To					
Ms. Indira Agarwal A103/2 Ahuna Divecha Complex B, Edulji Rd Charai, Thane, Mumbai 400601 Maharashtra India					
GSTIN 22AAAAAA0000A1Z5					
Invoice Date	Terms	Due Date			
13 Apr 2017	Due on Receipt	13 Apr 2017			
#	Item & Description	Qty	Rate	IGST	Amount
1	Stationeries	1.00 Dozen	500.00	18% 90.00	500.00
HSN: 9608					
Sub Total					500.00
IGST (18%)					90.00
Total					Rs.590.00
Balance Due					Rs.590.00

INVOICE					
Invoice# INV-000015					
<b>Zylker India</b> 5 Tadong Road Gangtok 737102 India					
GSTIN 33GSPTN0371G1ZD					
Bill To					
Ms. Indira Agarwal A103/2 Ahuna Divecha Complex B, Edulji Rd Charai, Thane, Mumbai 400601 Maharashtra India					
GSTIN 22AAAAAA0000A1Z5					
Invoice Date	Terms	Due Date			
13 Apr 2017	Due on Receipt	13 Apr 2017			
#	Item & Description	Qty	Rate	IGST	Amount
1	Stationeries	1.00 Dozen	500.00	18% 90.00	500.00
HSN: 9608					
Sub Total					500.00
IGST (18%)					90.00
Total					Rs.590.00
Balance Due					Rs.590.00



## GUJARAT FREIGHT TOOLS

Manufacturing & Supply of Precision Press Tool & Room Component

64, Akshoy Industrial Estate  
Near New Clooth Market,  
Ahmedabad - 380562

Tel : 079-25820309  
Web : www.gftools.com  
Email : info@gftools.com



GSTIN : 24HDE7487RE5RT4

### EXPORT INVOICE

#### ORIGINAL FOR RECIPIENT

Customer Detail	Invoice No.	4552	Invoice Date	05-Mar-2020
M/S	Phillip Morgan LTD.	Challan No.	IRL5212020	Challan Date
Address	24Henry Street, Co. Kerry, Spire, Kerry, Kerry - 75024			04-Mar-2020
PHONE	3538-94373720	L.R. No.	HR431	Due Date
GSTIN	-	Transport	STAR TRANSPORTS	20-Mar-2020
Place of Supply	Kerry	Transport ID	522304	Vehicle Number
Ship. Bill no	654732	Ship. Port code	INPB01	
Pre-carriage by	Royal Marine	Place of Pre-carriage	Dublin	
Port of Loading	Porbandar	Vessel/Flight No	BA2490	
Country of Origin	India	Final Destination	Co. Kerry	

Sr. No.	Name of Product / Service	HSN / SAC	Qty	Rate	Total
1	Automatic Saw 60 mm 400 W	8202	1.00 PCS	25.30	25.30
2	Electric Drill Machine 10mm 300W	84304120	1.00 PCS	12.50	12.50
			Total	2.00	37.80
	Total in words		Total Amount	EUR 38.00	
	THIRTY-EIGHT EURO ONLY		(E & O.E.)		
	Bank Details				
	Bank Name	State Bank of India			
	Branch Name	RAF CAMP			
	Bank Account Number	2000000004512			
	Bank Swift Code	SBININBB260			
	Terms and Conditions				
	1. Subject to India Jurisdiction. 2. Our responsibility ceases as soon as the goods leave our premises. 3. Goods once sold will not be taken back. 4. Delivery ex-premises.				
	Certified that the particulars given above are true and correct.				
	For Gujarat Freight Tools				
	This is computer generated invoice no signature required.				
	Authorized Signatory				

## GUJARAT FREIGHT TOOLS

Manufacturing & Supply of Precision Press Tool & Room Component

64, Akshoy Industrial Estate  
Near New Clooth Market,  
Ahmedabad - 380562

Tel : 079-25820309  
Web : www.gftools.com  
Email : info@gftools.com



GSTIN : 24HDE7487RE5RT4

### EXPORT INVOICE

#### ORIGINAL FOR RECIPIENT

Customer Detail	Invoice No.	4552	Invoice Date	05-Mar-2020
M/S	Phillip Morgan LTD.	Challan No.	IRL5212020	Challan Date
Address	24Henry Street, Co. Kerry, Spire, Kerry, Kerry - 75024			04-Mar-2020
PHONE	3538-94373720	L.R. No.	HR431	Due Date
GSTIN	-	Transport	STAR TRANSPORTS	20-Mar-2020
Place of Supply	Kerry	Transport ID	522304	Vehicle Number
Ship. Bill no	654732	Ship. Port code	INPB01	
Pre-carriage by	Royal Marine	Place of Pre-carriage	Dublin	
Port of Loading	Porbandar	Vessel/Flight No	BA2490	
Country of Origin	India	Final Destination	Co. Kerry	

Sr. No.	Name of Product / Service	HSN / SAC	Qty	Rate	Total
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Total 2.00 37.80

Total in words	Total Amount	EUR 38.00
THIRTY-EIGHT EURO ONLY	(E & O.E.)	

Bank Details

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Certified that the particulars given above are true and correct.

For Gujarat Freight Tools

This is computer generated invoice no signature required.

Authorized Signatory



## Laxmi Communication Hubli

Laxmi Communication Beside Aps, 580020, Hubli, Karnataka, Contact No - 9845861452

Invoice Number : 20223LC101171

### TAX INVOICE

Bill Date : 29-08-2022



LAXMI COMMUNICATION  
Beside Apasra Talkies Coen Road, CANARA BANK  
580020, Hubli, Karnataka  
Contact No - 08364264374  
GSTN - 29AAFL8694A1Z6  
Phone No - 9449860231  
GSTN -  
29AAACC6106G1ZX

#### Bill Summary

Product Name	HSN Code	Price (Incl GST)	Qty	CGST (%)	SGST (%)	Price (Excl GST)	Total
Redmi 9A Sport Carbon Black (2/32GB)	85171300	8500.00	1	9.00	9.00	7203.39	7203.39

- Goods once sold will not be taken back, until and unless approved by the manufacturer.
- Laxmi Communication Hubli is not responsible for the performance and the warranty of any device sold. Warranty if any, is provided only by the manufacturer and as per the manufacturer's own conditions.
- Goods once sold, can't be returned when it is physically damaged, tampered or water logged, will not qualify for any kind of warranty from the manufacturer.
- All warranty periods if any are mentioned in the warranty card of the manufacturer and is applicable from the date of this invoice.
- Jurisdiction for any kind of dispute will be in Hubli city only.

Store Signature

Promoter Name : KIRAN



## Laxmi Communication Hubli

Laxmi Communication Beside Aps, 580020, Hubli, Karnataka, Contact No - 9845861452

Invoice Number : 20223LC101171

### TAX INVOICE

Bill Date : 29-08-2022



LAXMI COMMUNICATION  
Beside Apasra Talkies Coen Road, CANARA BANK  
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Store Signature

Promoter Name : KIRAN

**TAX INVOICE**

Date : 15.07.22

: 1236

Code	Description	HSN	Qty	MRP	Disc	Rate	GST	Amount
11012145	B TRACK	61	1	490.00	21.42	468.58	5%	468.58
11024236	B FUL UND	61	1	359.00	15.69	343.31	5%	343.31
111003161	GARMENT	61	1	249.00	10.89	238.11	5%	238.11

Online payment =1050      3.00      48 Net Amount : 1050.00

Exactable: 1000.00 GST: 50.00

GST Rate	5%
Taxable	1000.00
CGST	2.50% 25.00
SGST	2.50% 25.00

Subject to Mumbai Jurisdiction      E. & O.E.      For MASTII KIDS ZONE  
GSTIN: 27EJDPP5643G1ZZ      Inclusive of GST  
State: Maharashtra      State Code: 27

\*Exchange can be made within 3 days after the date of bill.  
\*Exchange Time : 1.00 PM to 4.00 PM.  
\*Any defect or any complaint will be accepted if the goods were brought within one month after the date of bill.  
\*Bill is necessary in case of defects or any complaints.  
\*First wash Dry Clean only , Goods once sold will not be taken back.  
\*No Guarantee for Silk, Zari Items & Slippage of cloth.  
\*Used or altered clothes will not be exchanged.

**TAX INVOICE**

Date : 15.07.22

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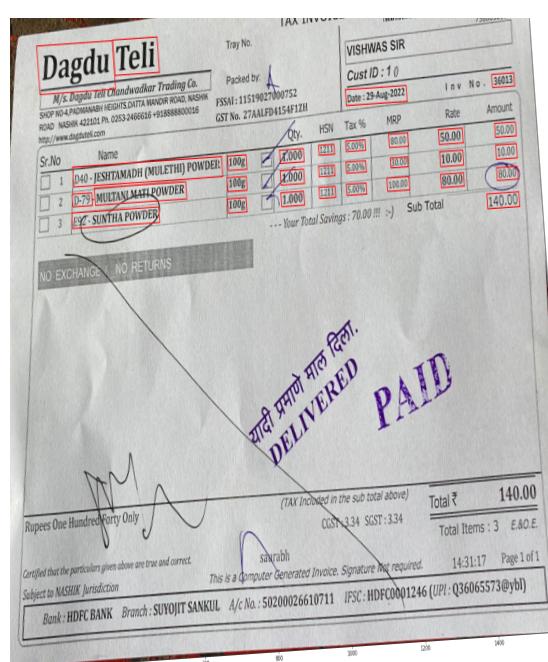
Exactable: 1000.00 GST: 50.00

GST Rate	5%
Taxable	1000.00
CGST	2.50% 25.00
SGST	2.50% 25.00

Subject to Mumbai Jurisdiction      E. & O.E.      For MASTII KIDS ZONE  
GSTIN: 27EJDPP5643G1ZZ      Inclusive of GST  
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\*First wash Dry Clean only , Goods once sold will not be taken back.  
\*No Guarantee for Silk, Zari Items & Slippage of cloth.  
\*Used or altered clothes will not be exchanged.

We can see here the model is unable to detect the invoice number as the string invoice number is not visible in the invoice image .



We can see that the model is unable to detect a few labels in the above invoice, which is due to a false prediction made by contour detection because some of the invoice is almost outside the image.

### **Methods adopted to Improve Performance :**

- To achieve a better invoice image result, various thresholding methods (Global Thresholding, Adaptive Mean Thresholding, Adaptive Gaussian Thresholding) were used in binarization during preprocessing.
- Several OCR models, including PyTesseract, PPOCR, easyOCR, MMOCR, and Keras-OCR were utilized for detection and recognition in the MultiOcr model, and the OCR model that generated the best results was chosen as the final model.
- Hyper parameter tuning is performed in the MultiOcr model's detection step with parameters width\_ths which specifies the maximum distance (horizontal) between two bounding boxes to be merged and mag\_ratio, which magnifies the image based on the factor given
- To improve results when predicting the template, various document similarity methods such as cosine similarity and Euclidean Distance were used.

### **Limitations of the model :**

- When a portion of the invoice is outside the image during contour detection, a corner that can be missing causes false detections.
- If there is a lot of noise in the background, a number of unwanted edges will be detected, and in some cases, the contour detection step can mistake those edges for the document
- If the text is more curved or small, such as a single integer alone at a location, the recognition model may make incorrect predictions.
- The model will be unable to predict the labels of new invoices whose template label coordinates are missing from the table (csv file)

## Conclusion:

With this work we propose an algorithm to detect the labels from the invoices using the Multi Ocr Model, we were able to successfully detect the positions of the labels for templates as well as the labels for any new invoices within the given templates for this we used OCR models like easyOCR as detection model and PaddleOCR as recognition model. Also we are happy to say that we are able to give better results with our algorithm.

## References :

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- [https://www.researchgate.net/figure/An-example-invoice-with-one-bounding-box-and-coordinates-shown-A-human-can-use-the\\_fig1\\_354310399](https://www.researchgate.net/figure/An-example-invoice-with-one-bounding-box-and-coordinates-shown-A-human-can-use-the_fig1_354310399)
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- <https://www.kaggle.com/code/dmitryemelyanov/receipt-ocr-part-1-image-segmentation-by-opencv>