


Task 2.3D Answer sheet

Fill in the “**Results**” column with relevant results

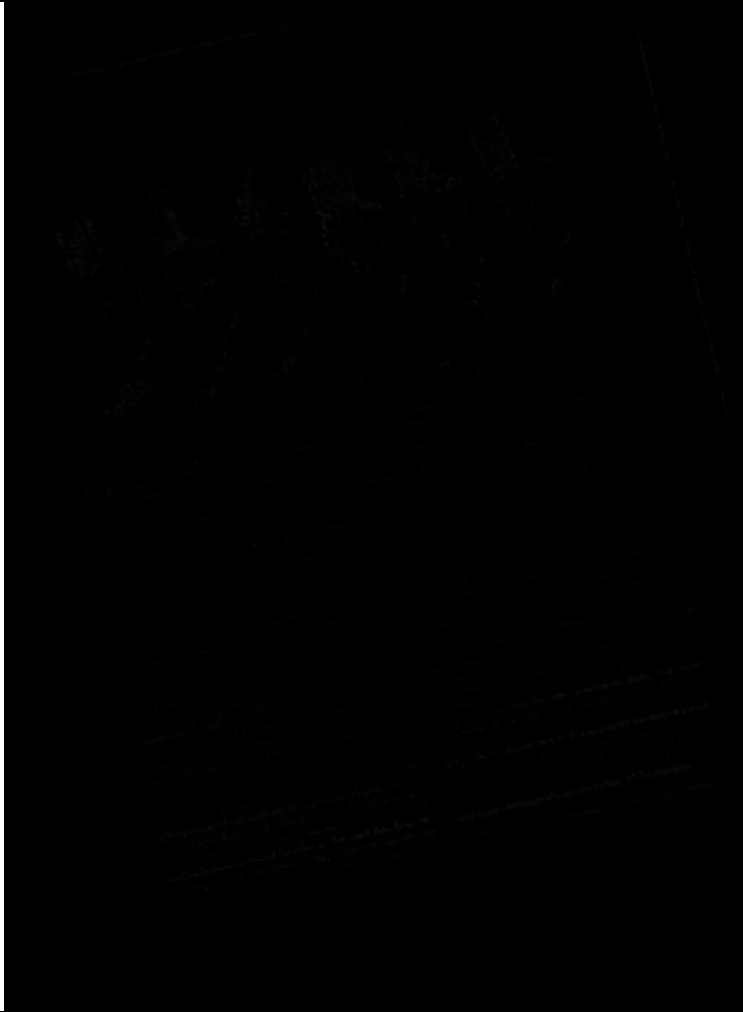
Notes:

- Examples are given for illustration purposes only and need to be replaced by your own results.
- Missing any required results will result in a re-submission.

1. Results of candidate point selection on doc.jpg

	Candidate points	Computational speed (in calculating candidate points)																								
Strategy a	<div></div> <p>Figure 3. Design sketches of the latent codes. Global latent codes are sensitive to point order and thus need pairwise-point correspondences from the shape prior, but produce less faithful reconstructions. Learning-based methods using incident to learn local latent codes tend to overfit, causing excessive geometry reconstruction but using correspondences. Optimization-based methods however learn accurate reconstructions. Our method achieves accurate geometry while preserving point correspondences.</p> <p>Table 1. Comparison of our method with existing works in point cloud reconstruction.</p> <table><tr><th></th><th>obj.</th><th>chair</th><th>table</th><th>car</th><th>lamp</th></tr><tr><td>Achilleos et al. [5]</td><td>2.46×10^{-3}</td><td>3.81×10^{-3}</td><td>1.15×10^{-2}</td><td>1.14×10^{-3}</td><td>7.95×10^{-3}</td></tr><tr><td>Zhang et al. [40]</td><td>2.59×10^{-3}</td><td>2.00×10^{-3}</td><td>3.59×10^{-3}</td><td>1.85×10^{-3}</td><td>3.36×10^{-4}</td></tr><tr><td>Ours</td><td>0.54×10^{-4}</td><td>0.66×10^{-4}</td><td>0.49×10^{-4}</td><td>0.55×10^{-4}</td><td>0.49×10^{-4}</td></tr></table> <p>point cloud by Achilleos et al. [5] is not editable. Compared with the results of Zhang et al. [40], our reconstruction results are also more accurate by a large margin.</p> <p>Qualitative results. We visually assess the quality of reconstructed point clouds by our method in Figure 4. As can be seen, our method algorithm can reconstruct target point clouds reasonably while preserving shape details better than other methods. For example, patterns on the back of chairs can be well recognized in our reconstructions.</p> <p>5.3. Ablation studies</p> <p>Global vs local latent codes. To further understand the effectiveness of our method, we provide an ablation study in Table 2 and Figure 5. Specifically, we build different baselines including learning-based (i.e., using learned coordinates) and optimization-based (i.e., using global latent codes) methods. Table 2 shows the global or local latent codes, which are then used by the SP-GAN for point cloud reconstruction. Table 2 shows that the learning-based baselines are generally better than the optimization-based ones. Additionally, optimizing local latent codes increases the precision of reconstruction. However, it is worth noting that this could lead to overfitting, as shown in the case of using incident to learn local codes. In this case, reconstructions are significantly corrupted by noise, point correspondences are significantly corrupted by noise, and shapes (see Figure 5), making subsequent shape manipulation impossible. Our method avoids this by using global latent codes, which are not sensitive to point order and thus can keep the correspondences intact. We found that global latent codes are more robust to noise and outliers. This is probably because the number of statistics that global latent codes learn is smaller than that of local latent codes. The results are not as good as those from the ShapeNet. Note that our method guarantees the reconstruction performance and dense correspondence assignment of the baselines.</p> <p>Table 2 also shows the results on the Animal dataset. As</p> <td>0.001999139785766601 6 seconds</td>		obj.	chair	table	car	lamp	Achilleos et al. [5]	2.46×10^{-3}	3.81×10^{-3}	1.15×10^{-2}	1.14×10^{-3}	7.95×10^{-3}	Zhang et al. [40]	2.59×10^{-3}	2.00×10^{-3}	3.59×10^{-3}	1.85×10^{-3}	3.36×10^{-4}	Ours	0.54×10^{-4}	0.66×10^{-4}	0.49×10^{-4}	0.55×10^{-4}	0.49×10^{-4}	0.001999139785766601 6 seconds
	obj.	chair	table	car	lamp																					
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Ours	0.54×10^{-4}	0.66×10^{-4}	0.49×10^{-4}	0.55×10^{-4}	0.49×10^{-4}																					

Strategy
y b









0.006463527679443359
seconds




Strategic y c		0.9639995098114014 seconds
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2. Performance analysis

Note: For each setting (i.e., a combination of a point selection strategy and density threshold), you need to fill in the respective cell of the setting with the following information.

- Deskewing result of the setting (i.e., a deskewed image of doc.jpg).
- Computational speed of applying the Hough transform and the entire skew estimation process (from input to output).

	density threshold 1 (10)	density threshold 2 (15)	density threshold 3 (20)
Strategy a	 <p>Hough time: 0.1670849323272705 seconds Total time: 0.2960667610168457 seconds</p>	 <p>Hough time: 0.18290948867797852 seconds Total time: 0.34273219108581543 seconds</p>	 <p>Hough time: 0.24344778060913086 seconds Total time: 0.37578439712524414 seconds</p>
Strategy b	 <p>Hough time: 0.016517162322998047 seconds Total time: 0.023608684539794922 seconds</p>	 <p>Hough time: 0.01272439956665039 seconds Total time: 0.026520252227783203 seconds</p>	 <p>Hough time: 0.02777266502380371 seconds Total time: 0.055969953536987305 seconds</p>

Strategy c			
	Hough time: 0.024947404861450195 seconds Total time: 0.05252861976623535 seconds	Hough time: 0.015410184860229492 seconds Total time: 0.02565765380859375 seconds	Hough time: 0.018285512924194336 seconds Total time: 0.03241539001464844 seconds

3. Other test cases

Based on the results in Section 2, choose ONE point selection strategy and ONE density threshold that you find best.

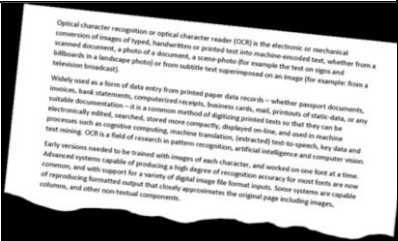
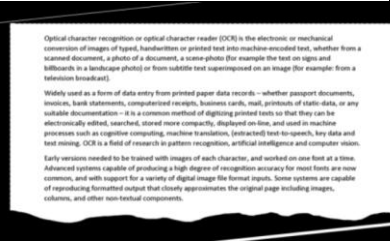
What is your chosen point selection strategy?

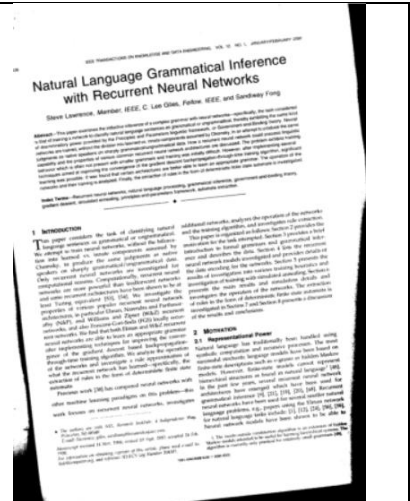
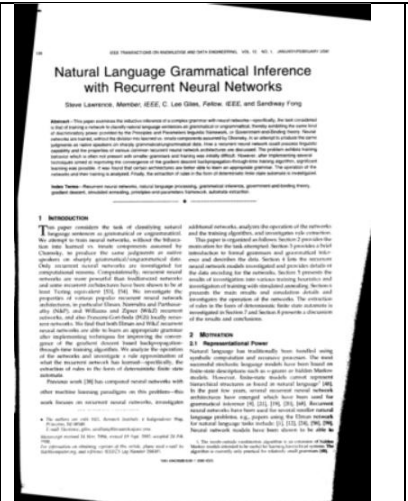

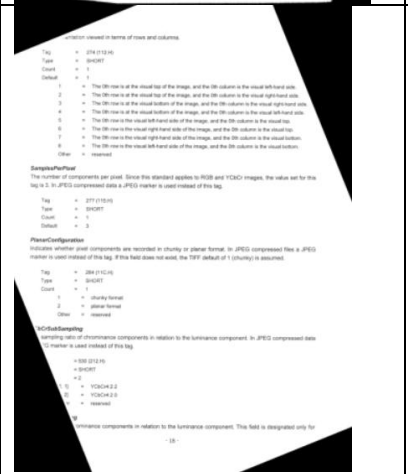

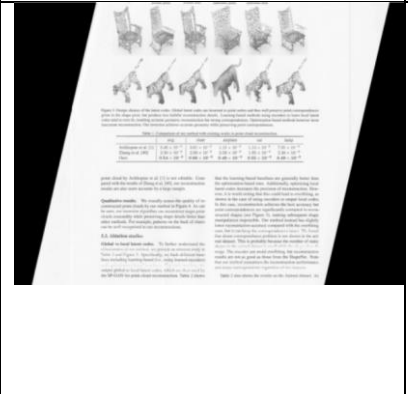
Strategy B



What is your chosen density threshold?

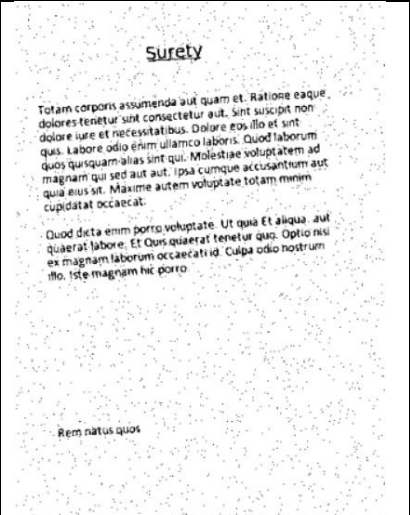
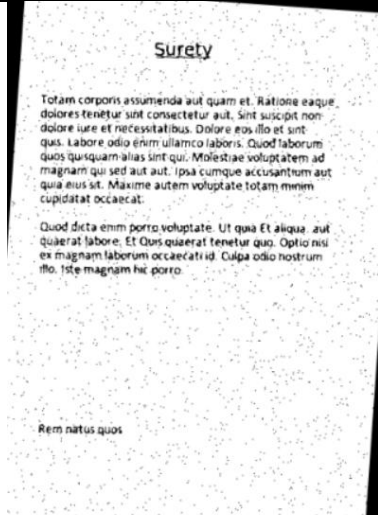
15

Results of other test cases

	Input image	Output image (deskewed)	Computational speed (candidate point selection, Hough transform, entire process)
Test case 1			Computational speed of candidate points using strategy B: 0.00099849700927734 38 seconds Hough time: 0.00399732589721679 7 seconds Total time: 0.00499820709228515 6 seconds

<p>Test case 2</p>			<p>Computational speed of candidate points using strategy B: 0.00099563598632812 5 seconds Hough time: 0.00258660316467285 16 seconds Total time: 0.00258660316467285 16 seconds</p>
<p>Test case 3</p>			<p>Computational speed of candidate points using strategy B: 0.00299048423767089 84 seconds Hough time: 0.02438545227050781 2 seconds Total time: 0.03911519050598144 5 seconds</p>
<p>Test case 4</p>			<p>Computational speed of candidate points using strategy B: 0.01200747489929199 2 seconds Hough time: 0.01402592658996582 seconds Total time: 0.02253198623657226 6 seconds</p>
<p>Test case 5</p>	<p> Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum. </p>	<p> Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum. </p>	<p>Computational speed of candidate points using strategy B: 0.00099825859069824 22 seconds Hough time: 0.00200128555297851 56 seconds Total time: 0.00200128555297851 56 seconds</p>

<p>Test case 6</p>			<p>Computational speed of candidate points using strategy B: 0.0007431507110595703 seconds Hough time: 0.0012323856353759766 seconds Total time: 0.0027768611907958984 seconds</p>
<p>Test case 7</p>			<p>Computational speed of candidate points using strategy B: 0.0007674694061279297 seconds Hough time: 0.0009286403656005859 seconds Total time: 0.0015017986297607422 seconds</p>
<p>Test case 8</p>			<p>Computational speed of candidate points using strategy B: 0.0070035457611083984 seconds Hough time: 0.015010833740234375 seconds Total time: 0.022342205047607422 seconds</p>
<p>Test case 9</p>			<p>Computational speed of candidate points using strategy B: 0.0009949207305908203 seconds Hough time: 0.0010001659393310547 seconds Total time: 0.0015087127685546875 seconds</p>


<p>Test case 10</p>			<p>Computational speed of candidate points using strategy B: 0.00100111961364746 1 seconds Hough time: 0.00132513046264648 44 seconds Total time: 0.00132513046264648 44 seconds</p>
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Observe and discuss the results. Does the Hough transform accurately work in every case? If not, what could be the reason and how to address it?

In my case, all of the Hough transform work accurately in every cases.

4. Text recognition using pytesseract

Provide screenshots with recognised text highlighted to showcase the effectiveness of skew correction to text recognition.

	Text recognition without skew correction (screenshot)	Text recognition with skew correction (screenshot)
<p>doc.jpg</p>		

Test case 1	<p>OCR result before deskew:</p> <p>Photo (for example the text on sign) superimposed on an image (for example from subtitle text; whether from signs and example: from a whether passport documents,</p>	<p>OCR result after deskew:</p> <p>Optical character recognition or optical character reader (OCR) is the electronic or mechanical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image (for example: from a television broadcast).</p> <p>Widely used as a form of data entry from printed paper data records – whether passport documents, invoices, bank statements, computerized receipts, business cards, mail, printouts of static-data, or any suitable documentation – it is a common method of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as cognitive computing, machine translation, (extracted) text-to-speech, key data and text mining, OCR is a field of research in pattern recognition, artificial intelligence and computer vision.</p> <p>Early versions needed to be trained with images of each character, and worked on one font at a time. Advanced systems capable of producing a high degree of recognition accuracy for most fonts are now common, and with support for a variety of digital image file format inputs. Some systems are capable of reproducing formatted output that closely approximates the original page including images, columns, and other non-textual components.</p>
Test case 2	<p>OCR result before deskew:</p> <p>8 cer mre 90 nH nt NON SAAQEDRIATY 228</p> <p>Natural Language Grammatical Inference with Recurrent Neural Networks</p> <p>Steve Lawrence, Member, IEEE, C. Lee Giles, Fellow, IEEE, and Sandiway Fong:</p> <p>rads pe al ea rnc car IE et seca, ve wsk consid earns ma ge er Te on</p> <p>rome anager Os 7 rtf m) pee 'pene Fag varmont of GOFOTENS ying eon. How oe rene we ee onroveared en org rece ne ST</p> <p>cere anne oak pavly great wee ne of a cay ch 00 femal</p> <p>eee ama 2K OTI connor</p> <p>tcl new wn renee ae</p> <p>sr rn wg aa can pacientes me haters gated.</p> <p>4 fwtRODUCTION</p> <p>vas paper core: He cof classifying aturel ait ees a7 Ey eae sentences Mamata or ergs a gai ee aig ago ah ope gtes rae estar tame to ter neural Se Neithout the Gifste" oe per engi 2 FOUR rion 2 provide we eye. Heared vs, nate so On ae te S ton egy to produce the ponents ae nate ree ornal pears Grammatical nie speakers on sharply asl /unqrarsee ino deserves the a na an tnt the Feces speak great eM at amigated for neural re models vestned 238 provides details of Crpatabonal rear' oa nay CUE MEN rea oti ee See peor presents Ne compare ore more powertill may een networks cee of moet ito varies IN pears a8 neo pccurren reset "pee shown toe 2 ce igation of taining wdt ar ek aealing SCHON</p>	<p>OCR result after deskew:</p> <p>TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING. VOL. 12, NO.</p> <p>ere</p> <p>Natural Language Grammatical Inference with Recurrent Neural Networks</p> <p>Steve Lawrence, Member, IEEE, C. Lee Giles, Fellow, IEEE, and Sandiway Fong</p> <p>[Abstract-This paper examines the induction of more complex grammar with our natural-language processing task considered. 'Sitar' of vanings rework to cast natlangatescenes as granatcal or ungrammatcal Drereby exting the same kind</p> <p>of acrmatory power growed by the</p> <p>rotlie and Parameters ings tawetok ot government and eworg theory. Neu</p> <p>'etworks ar waned, winout he vison mo teamed vs nale components assumed by Chowsky, nh alert to produce he ame fuagmonte as nave apenas cn sharply grammancatuegrarsmabcal daa. How a recur neva netecrk cus possess Mpusie Capably andthe properties of vavove common recurs ura rataork archiectiven are dcused. Te problem exis Maning tenavor wch 2 len not present wah emaber ramare a Wiring wes may feu However, ater implementing several</p> <p>fecheliques med at ungroving te convergence Otte graent descent backpropagationthrcuviae vaning oigatty, rilcant tearing was posse i was found that oeran archaectures oe bse abo 1 lam an appropriate grammar. The Opera of he</p> <p>senor and tev tracing analyzed. Fal, the eracton fr i he form determinate</p> <p>estgaid</p> <p>Icon Terme- Recurrent naural networks, natal nguage process, grmel ference, government anbinding Meer. (raientdescere, smulated annealing, principis-and-parameters tarhrwk.aulomata exarpen,</p> <p>1 Irropuction</p> <p>ss paper considers the task of classifying natural language sentences as grammatical or ungrammatnical</p> <p>We attempt to train neural networks, without the bifurea</p>
Test case 3	<p>OCR result before deskew:</p>	<p>OCR result after deskew:</p> <p>entation viewed in terms of rows and columns.</p> <p>Tag = 274 (112,H)</p> <p>Type = SHORT</p> <p>Count = 1</p> <p>Default = 1</p> <p>1 = The 0th row is at the visual top of the image, and the 0th column is the visual left-hand side. 2 = The 0th row is at the visual top of the image, and the 0th column is the visual right-hand side. 3 = The 0th row is at the visual bottom of the image, and the 0th column is the visual right-hand side. 4 = The 0th row is at the visual bottom of the image, and the 0th column is the visual left-hand side. 5 = The 0th row is the visual left-hand side of the image, and the 0th column is the visual top. 6 = The 0th row is the visual right-hand side of the image, and the 0th column is the visual top. 7 = The 0th row is the visual right-hand side of the image, and the 0th column is the visual bottom. 8 = The 0th row is the visual left-hand side of the image, and the 0th column is the visual bottom. Other = reserved</p> <p>SamplesPerPixel</p> <p>The number of components per pixel. Since this standard applies to RGB and YCbCr images, the value set for this tag is 3. In JPEG compressed data a JPEG marker is used instead of this tag.</p> <p>Tag = 277 (115,H)</p> <p>Type = SHORT</p> <p>Count = 1</p> <p>Default = 3</p> <p>PlanarConfiguration</p> <p>Indicates whether pixel components are recorded in chunky or planar format. In JPEG compressed files a JPEG marker is used instead of this tag. If this field does not exist, the TIFF default of 1 (chunky) is assumed.</p>

Test case 4	OCR result before deskew:	OCR result after deskew: codes tend to over-fit, resulting accurate geometry reconstruction but wrong c inaccurate reconstruction. Our inversion achieves accurate g 1ape prior, but produce less faithful reconstruction details. Learning-based methods using hod with existir encoders to learn local latent orespondences. Optimization-based methods however incur
Test case 5	OCR result before deskew:	OCR result after deskew: } Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.
Test case 6	OCR result before deskew:	OCR result after deskew:
Test case 7	OCR result before deskew:	OCR result after deskew: ‘on sensor networks was origit ivated by military applications. s of military sensor networks Fz je-scale acoustic surveillance sy an surveiance to small network round sensors for ground target a

<p>Test case 8</p>	<p>OCR result before deskew:</p> <p>Paysage dans l'art</p> <p>La notion de paysage dans l'art englobe la représentation des paysages par les différents arts : peinture, le dessin, la photographie, etc.</p> <p>La représentation du paysage joue un rôle important dans les arts graphiques. Elle peut, entre autres, s'opposer parfois à la représentation des êtres, ou bien peut être utilisée pour les symboliser (peinture religieuse). En peinture, le paysage est un genre aux côtés de la peinture d'histoire, du portrait, de la nature morte et de la peinture figurative.</p> <p>L'importance du paysage dans la Chine Traditionnelle</p> <p>Le paysage a joué un rôle majeur dans l'histoire et principalement dans la Chine traditionnelle. En Chine, la conception du paysage est différente qu'en occident.</p> <p>Les peintres chinois ont leurs propres langages : vide, vide médian, plein, souffle, (voir livre de François Cheng).</p> <p>Une estampe chinoise peinte sur un éventail. On peut observer 6 gauches deux individus dont un 4 cheval. Ces derniers se penchent probablement à leur maison familiale qui se situe tout à droite de l'estampe.</p> <p>Si l'on observe attentivement une peinture, une estampe chinoise, on remarquera que souvent, un, ou plusieurs personnages y figurent. Ces derniers sont peints très petits, par rapport au paysage. Ils sont souvent peints au milieu de la toile (mais pas toujours). Ainsi, le spectateur qui observera la toile, aura l'impression d'être à la place du personnage et de pouvoir bénéficier de la vue de celui-ci. Tel est l'effet voulu par les peintres chinois.</p> <p>Histoire du paysage en peinture-Occident-De l'Antiquité au Moyen Âge</p> <p>Paysage de l'Odyssée dans la Maison de la via Graziosa, I^{er} siècle av. J.-C.</p>	<p>OCR result after deskew:</p> <p>Paysage dans l'art</p> <p>La notion de paysage dans l'art englobe la représentation des paysages par les différents arts : peinture, le dessin, la photographie, etc.</p> <p>La représentation du paysage joue un rôle important dans les arts graphiques. Elle peut, entre autres, s'opposer parfois à la représentation des êtres, ou bien peut être utilisée pour les symboliser (peinture religieuse). En peinture, le paysage est un genre aux côtés de la peinture d'histoire, du portrait, de la nature morte et de la peinture figurative.</p> <p>L'importance du paysage dans la Chine Traditionnelle</p> <p>Le paysage a joué un rôle majeur dans l'histoire et principalement dans la Chine traditionnelle. En Chine, la conception du paysage est différente qu'en occident.</p> <p>Les peintres chinois ont leurs propres langages : vide, vide médian, plein, souffle, (voir livre de François Cheng).</p> <p>Une estampe chinoise peinte sur un éventail. On peut observer 6 gauches deux individus dont un 4 cheval. Ces derniers se penchent probablement à leur maison familiale qui se situe tout à droite de l'estampe.</p> <p>Si l'on observe attentivement une peinture, une estampe chinoise, on remarquera que souvent, un, ou plusieurs personnages y figurent. Ces derniers sont peints très petits, par rapport au paysage. Ils sont souvent peints au milieu de la toile (mais pas toujours). Ainsi, le spectateur qui observera la toile, aura l'impression d'être à la place du personnage et de pouvoir bénéficier de la vue de celui-ci. Tel est l'effet voulu par les peintres chinois.</p> <p>Histoire du paysage en peinture-Occident-De l'Antiquité au Moyen Âge</p> <p>Paysage de l'Odyssée dans la Maison de la via Graziosa, I^{er} siècle av. J.-C.</p> <p>Dans l'antiquité grecque et romaine, le paysage n'est peint que comme fond ou environnement pour</p>
<p>Test case 9</p>	<p>OCR result before deskew:</p>	<p>OCR result after deskew:</p> <p>text which can be easily used for electronic storage but during properly placed in scanner it included the skew which degrades</p> <p>to increase the performance of OCR system we must detect! normally when skew is detected and main work is done by direction. there are various methods for detecting the skew Fourier transform Hough transform nearest neighbor correlation and Mathematical morphology so different researchers have proposed this problems. many researchers used projection profile in function with creating histogram where the cost function</p>
<p>Test case 10</p>	<p>OCR result before deskew:</p> <p>‘Yotam corporis assumenda ‘gut quam et. Rationes eaque. Fear tenetuy aint consecatur aut Sint sukePA 108 dolore iure et receysitatibus. Dolore £05 io et sint quis. Labore dio efi ullarncio labor Quod laborur quos quisquarnaias Sint qui-Miolestiae ‘voluptatem ad magoarh qui sed aut aut, 1ps8 Cumave aécusantiom aut uta avs't. Maxime autem voluptate tot rye cupidatat occaecat:</p> <p>quod dicta én porravoluptaté, Ut gue EC abah2, 2 quaerat labore: er Qus.quaerat tenetur quo. Optio nish da inagnamlaboram occaceatt (a Culpa odio nostrum Ho, iste magne Hie Bor:</p> <p>Rem natys Quos</p>	<p>OCR result after deskew:</p> <p>Totam corporis assumenda aut quam et Ratione eaque’, dolorenietur sint consactetur gut, Sint suscipit non: dolore iure et necessitatibus. Dolore e0s flo et sint quis. Labore odio eur ullanico labor's, Quod laborum u05 quisquam alias sint-qui. Mofestiae woluptatem ad ‘magnart qui sed aut aut. Ipsa cumque accusanteum aut quia ewus it. Maxime autem voluptate totam minim cupidatat occaecat:</p> <p>Quod dieta emm porravoluptaté. Ut quia Et aliqua. aut Quserat labore; Et Quis quzerat tenetur quo. Optio nisi ex magnamlaborum occaecatiid. Culpa odio nostrum Mo, iste magnam hit gorro.</p> <p>Rem natus quos</p>