

Dekeystoning & Dewarping with ComicEnhancer Pro

Version 1.0

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<http://www.mediafire.com/folder/f0z2hexqdnr9a/Software>

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A. Installation

- Since v5.00, ComicEnhancer Pro (CEP) has added some new functions & interfaces.
- If you run CEP directly, you can only see the classic interface. The new interfaces need to be started with command line parameters. See the help of CEP for details .
- In order to simplify the startup process, you can set up shortcuts on the desktop, and enter the new interfaces through the shortcuts.
- The process of creating shortcuts is software installation.

Installation

1. Download CEP zip package from my net disk: ComicEnhancerPro_eng.zip
2. Unzip it and get two new files, as shown in Figure 1 :
ComicEnhancerPro.exe
ComicEnhancerPro.htm
3. Double click ComicEnhancerPro.exe to enter classic interface.
4. Click “file -> Create shortcut” menu, as shown in Figure 2.

Double click this icon to enter classic interface

Help file for CEP

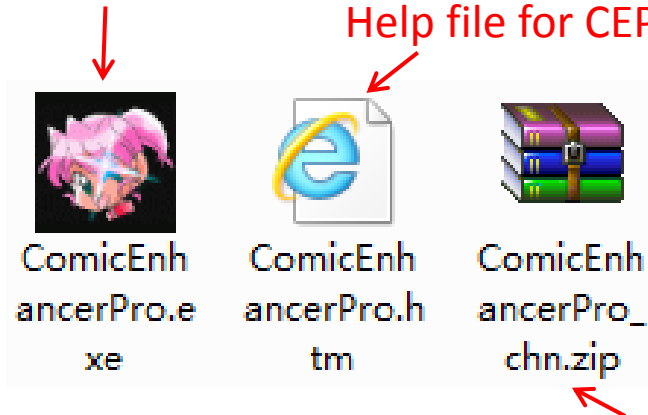


Figure 1

Downloaded zip package. Please unzip it.

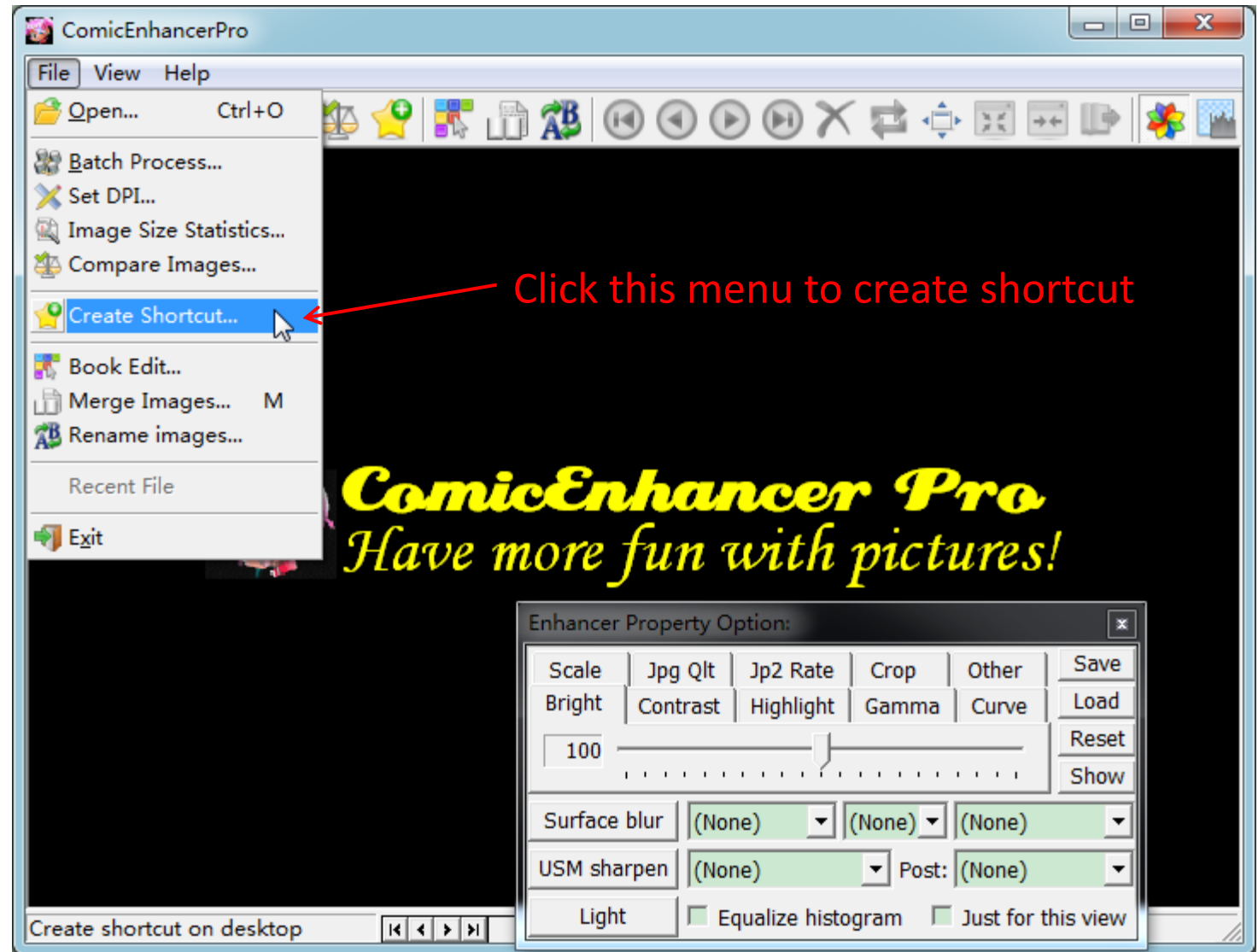


Figure 2

5. In the pop-up "create shortcut" dialog box, check all options, and then click "OK", as shown in Figure 1.
6. At this time, you can see the selected shortcuts on the computer desktop, as shown in Figure 2. Double click to enter the corresponding interface.

Double click this icon on the desktop to start CEP, and enter the book processor interface.

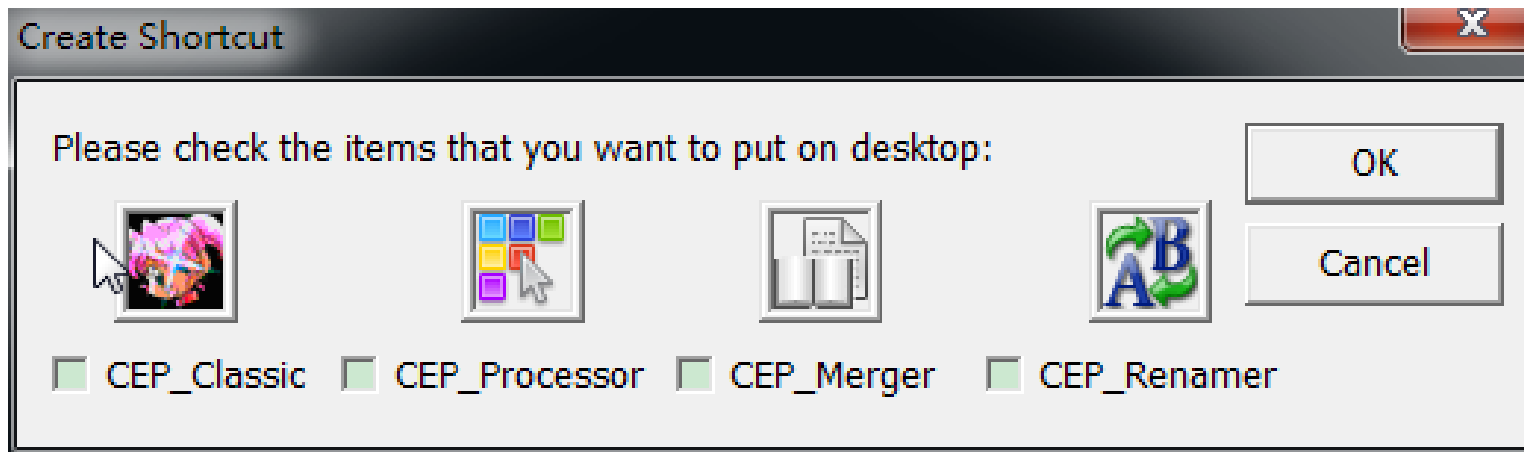


Figure 1

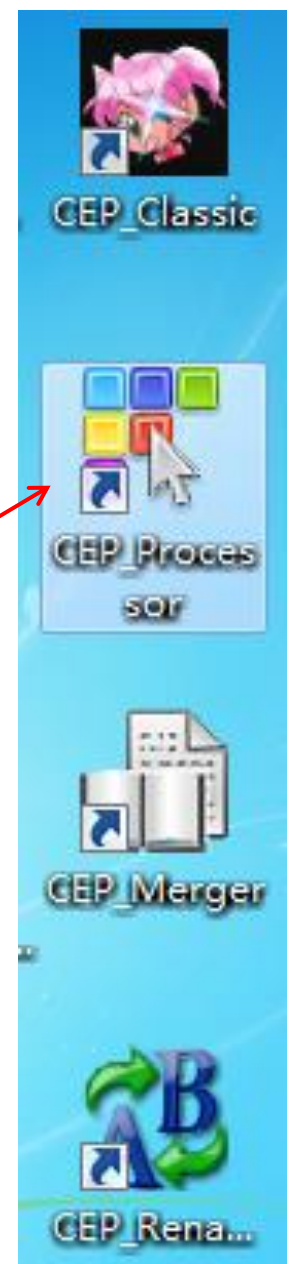


Figure 2

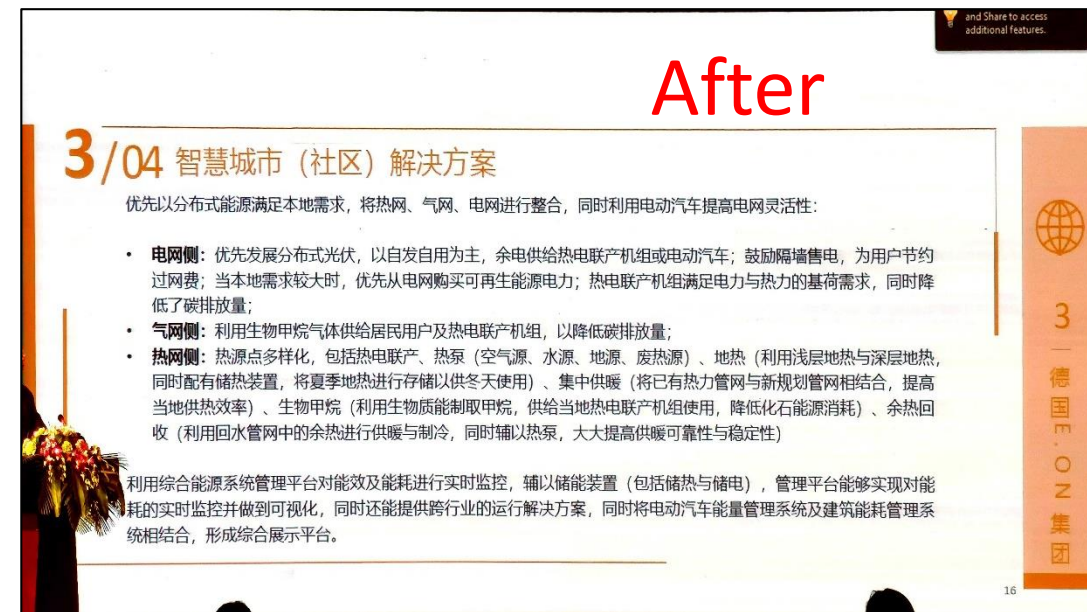
B. De-keystoning

- Keystoning, also known as "perspective distortion". Because it is the "far small, near large" principle of perspective that causes the rectangle to be taken as a trapezoid when the photographic plane of the camera is not parallel to the plane to be photographed.
- Dekestoning is usually used to correct PPT, whiteboard, Kanban and other images with clear four boundaries.
- CEP is to identify the boundaries by finding straight lines. So it requires that the image must contain a complete straight edge. That is, PPT, whiteboard and so on must be photographed completely, and leave a little edge space around.
- This chapter will take the PPT taken by smart phone as an example to illustrate its usage.

Prepare for example

1. Download ComicEnhancerPro_D&D_Examples.zip from my net disk.
2. Unzip it and you'll see PPT folder that the example images in.
3. You can first look at "out.pdf", compare it with the original photo, as shown in the right pictures.
4. Double click "CEP_Processor" icon on the desktop to start CEP, and enter the book processor interface.

Double click this icon on the desktop to start CEP, and enter the book processor interface.



Source: D:\mm\PPT
Output: D:\mm\PPT\out
☒ Renumber Start: 1 Step: 1 Digits: 6
Prefix: Suffix: Ext: Auto

Source	Target
IMG_20190110_1427...	
IMG_20190110_1428...	
IMG_20190110_1431...	
IMG_20190110_1432...	
IMG_20190110_1434...	
IMG_20190110_1435...	
IMG_20190110_1435...	
IMG_20190110_1436...	

1/8 3648*2736*24, 72 dpi
Page: Dekeystone+Cutting edge,
LT=2020056 RT=30AFFD5 RB=FE85FFBF
LP=FE540049, Size=Auto

Save
Load
Copy
Paste

2. Click "Page" tab.

3. Click "Dekeystone + Cut edge" and wait until the results come out.

Paper Page Layout Pic Output
Auto Dewarping by:
Auto1 Textline extend
Size: Auto Size Illum: Normal
Scale: 16:9 Split page before dewarping!
Result: 3532 * 1843 Reset Grid: No

Target Source Show: Auto Zoom: 100%

1. Drag and drop the extracted PPT image file from Explorer, it will fill the file list and select the first one automatically.

Result



Source

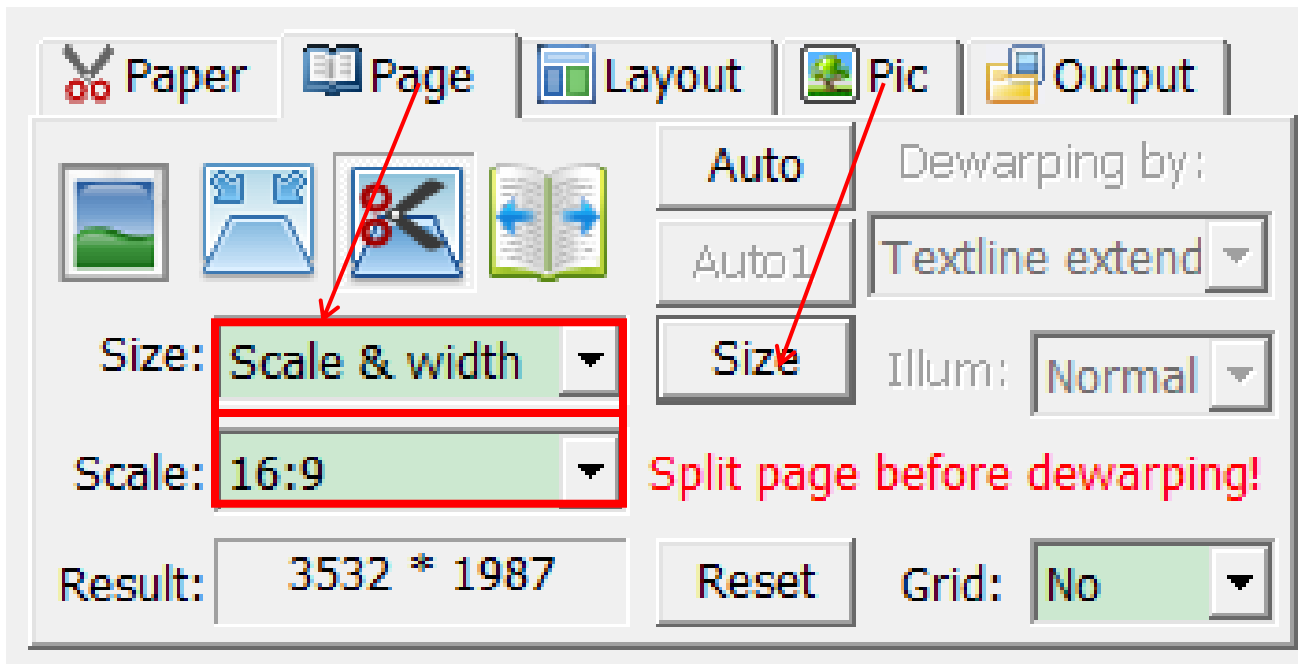


If you are not satisfied with the automatically found trapezoid, you can drag the green boxes at the four corners to manually adjust the vertices. If you are not satisfied with the result of manual adjustment, click the "Auto" button to automatically find again.

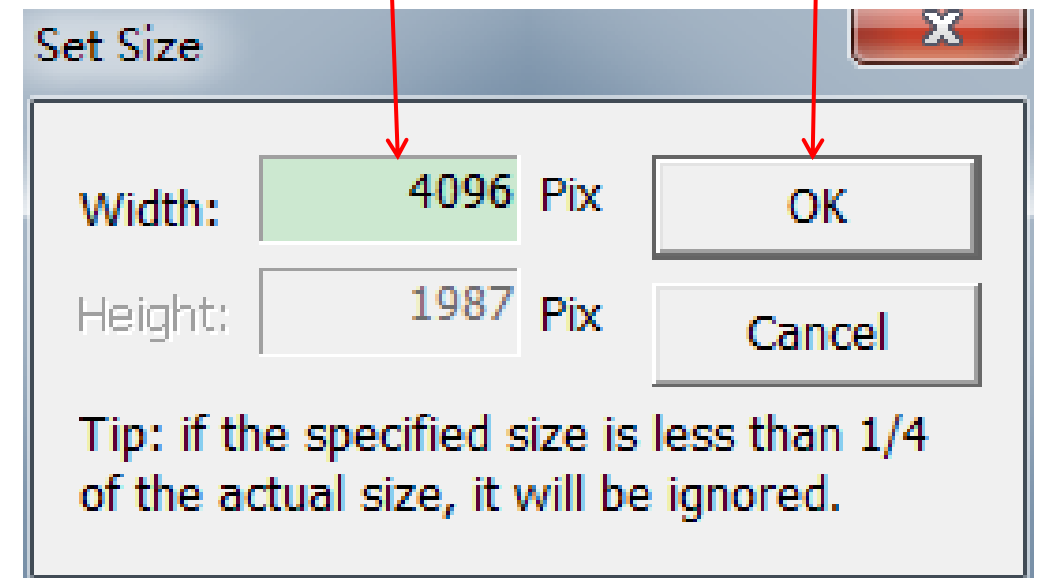
4. This example plans to convert the processed images into PDF. It requires that the page size in PDF is exactly the same, so we need to accurately set the size of the cutting results:

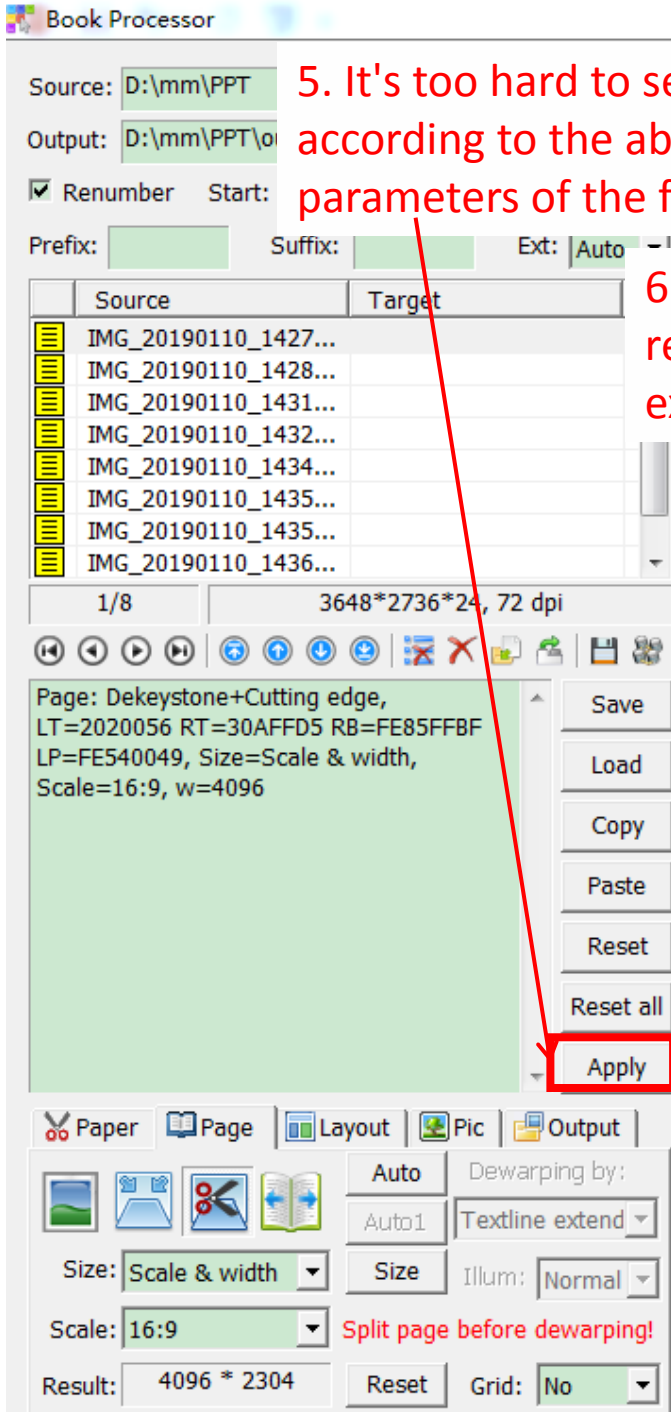
- A. Select "Scale & width" in "Size" combo box.
- B. Select "16:9" in "Scale" combo box.
- C. Click "Size" button to set width as 4096, a lucky number that more and near the actual width 3532.

Select "Size" and "Scale", then click "Size" button.



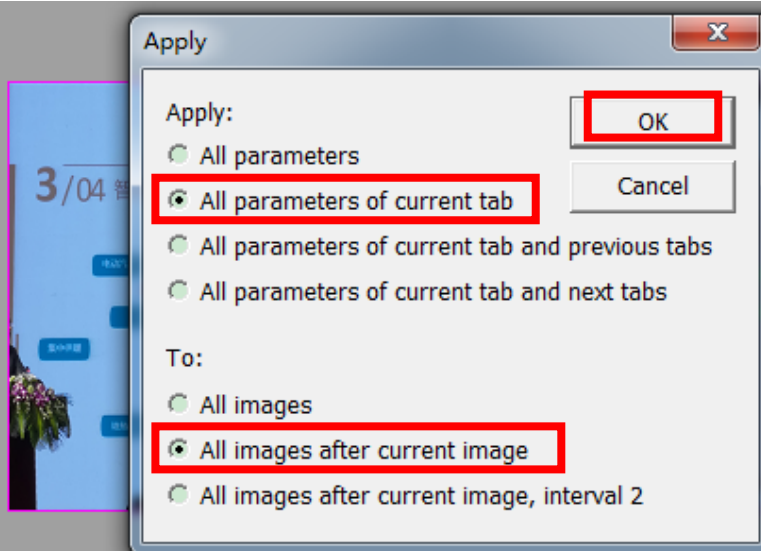
Input new width, then click OK button.





5. It's too hard to set each PPT one by one. So after setting the first PPT according to the above steps, click the "Apply" button to apply the setting parameters of the first PPT to all PPT files.

6. Then Double click the preview area, turn the page before and after to see the result of automatic cutting. If you are not satisfied, adjust it manually. In this example, I manually adjusted the left boundary of sheets 1 and 5.



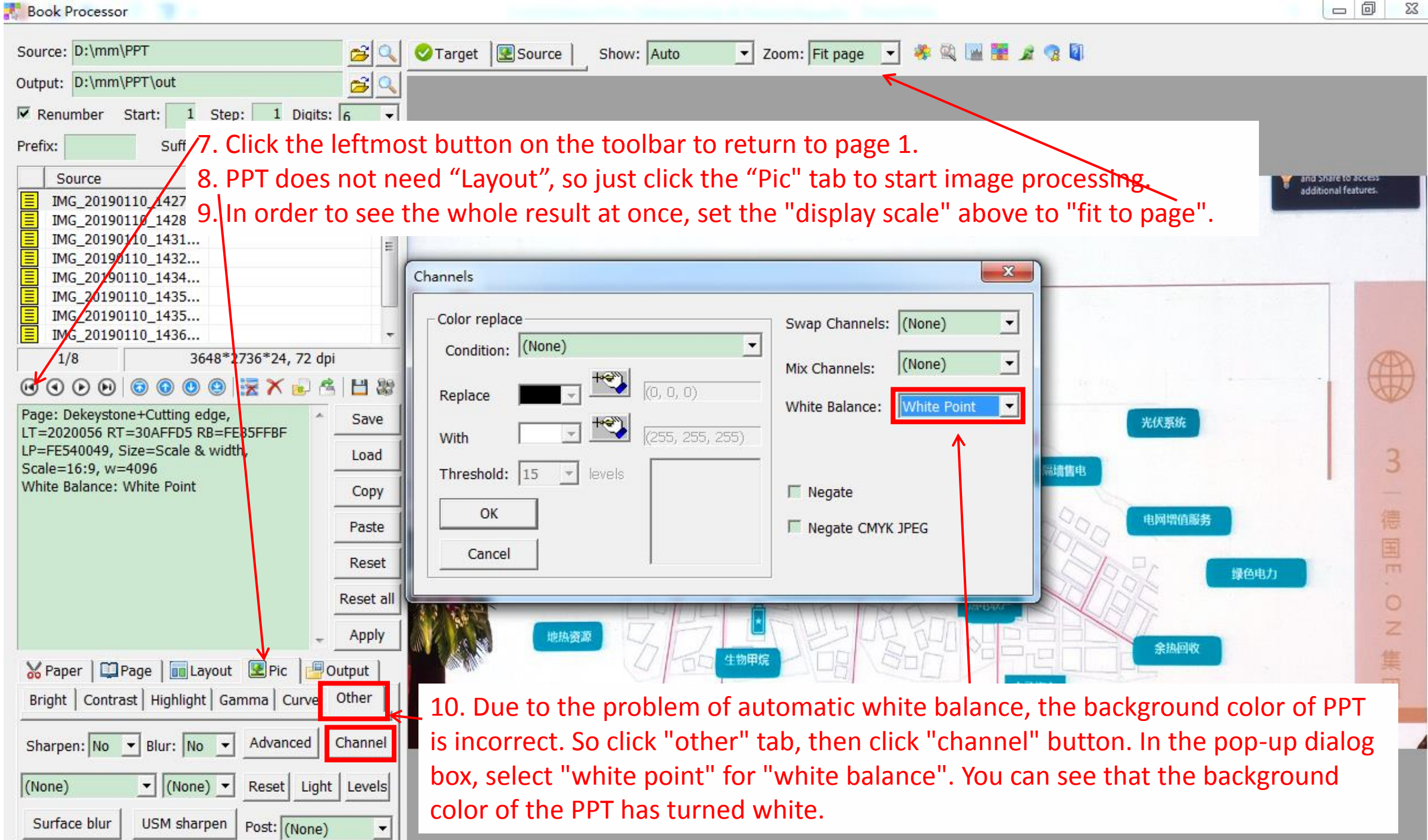
Double click
left part to
page forward

Double click
right part to
page backward



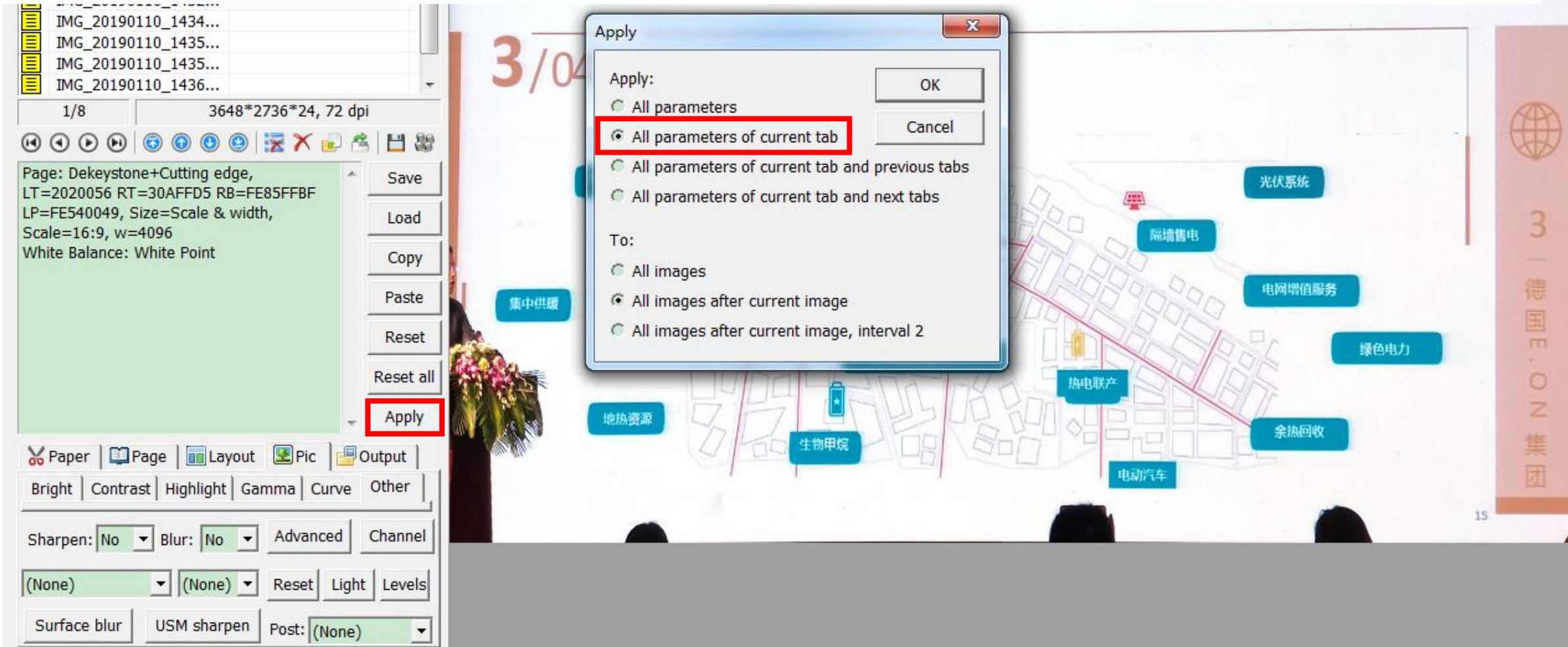
Double click
left part to
page forward

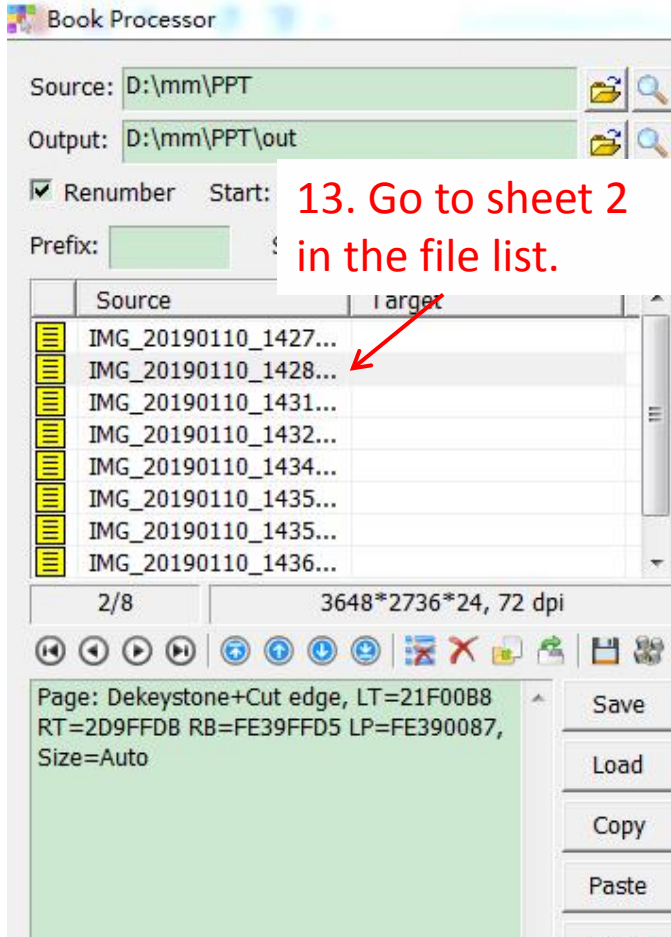
Double click
right part to
page backward



11. Click the "apply" button to copy the white balance to other PPTs. However, it must be noted that you can only select "All parameters of current tab " for the "Apply" option, otherwise the trapezoidal vertex manually adjusted in the "page" tab will be destroyed.

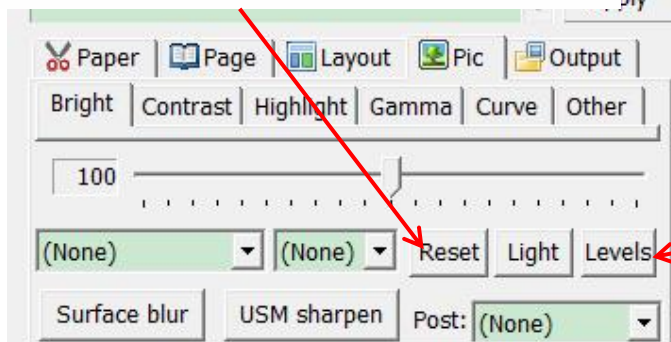
12. Then double click left and right parts of the image preview window, turn the page back and forth to see the effect after the application of white balance. Except for the second sheet, there was nothing wrong with it, so the second sheet would be corrected by Levels.





13. Go to sheet 2 in the file list.

14. Click "reset" button to clear "white balance" setting.

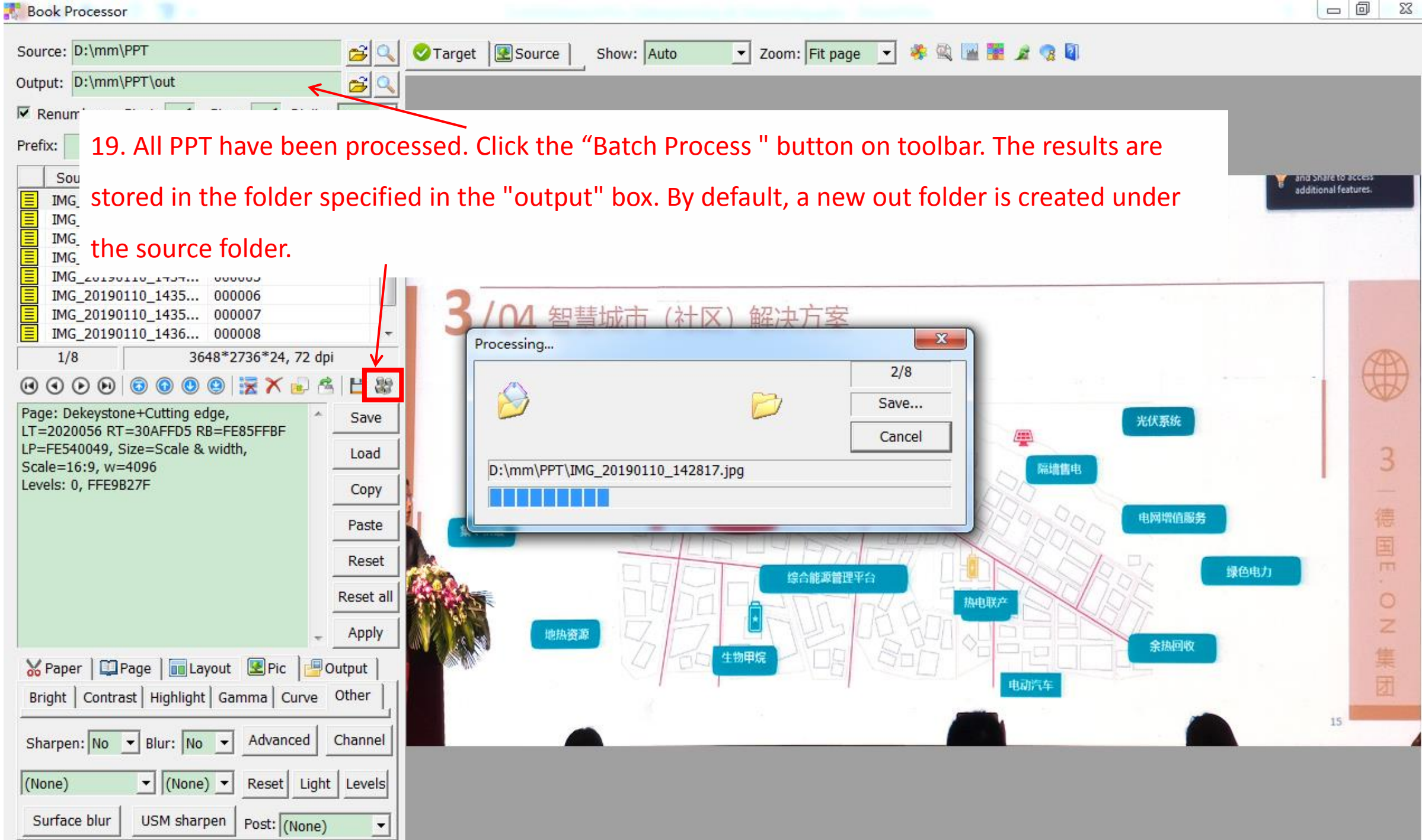


15. Click "Levels" button to pop up the levels dialog box.

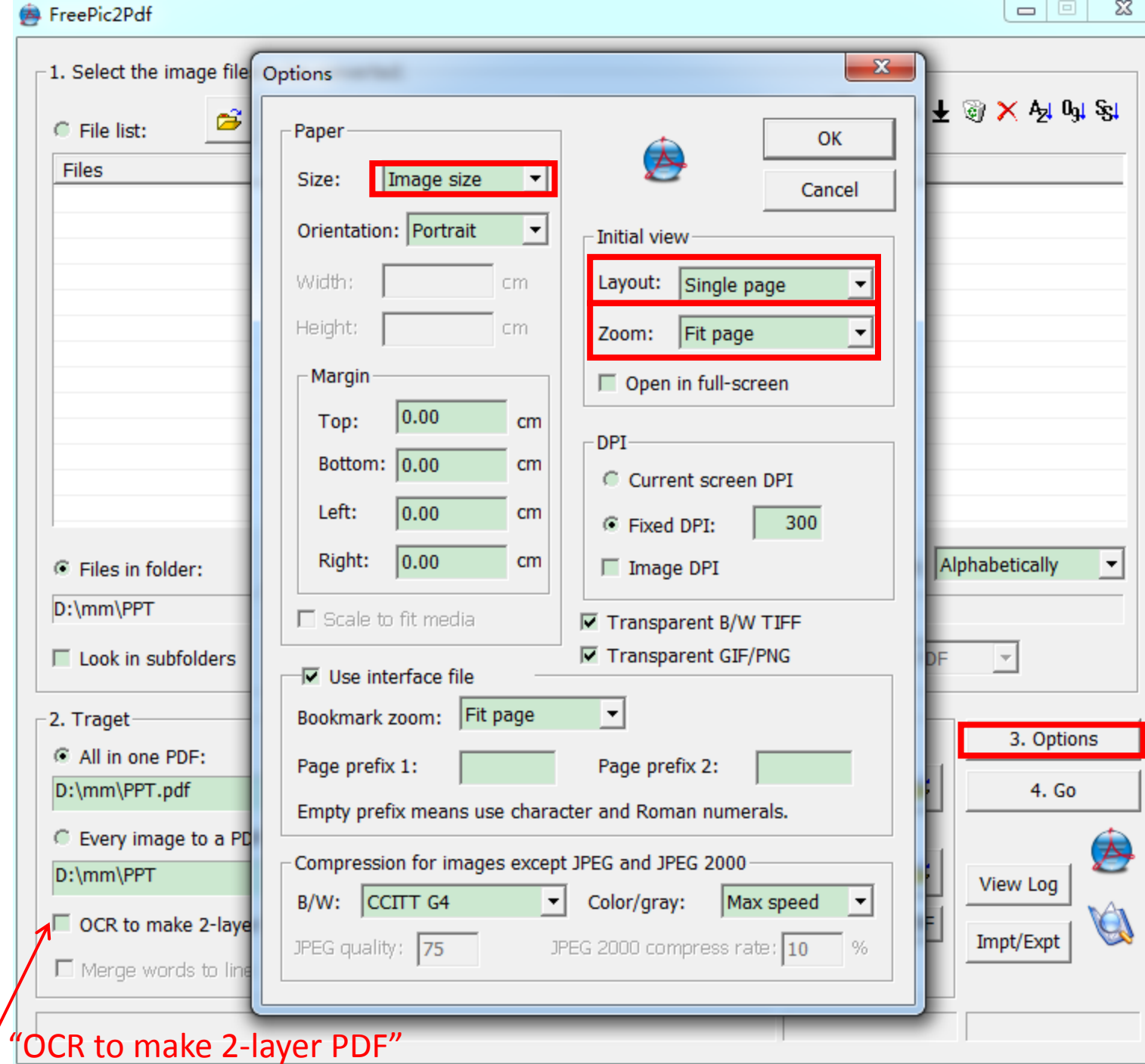
16. Click "Light" icon. After moving the cursor to the image area, the cursor becomes a straw shape, and click on the image background to get color until the background becomes white.

17. Click "shadow" icon. After moving the cursor to the image area, the cursor becomes a straw shape. Click on the text to get color until the text turns black.

18. Click "OK" to save and return, or click "reset" to restore.



Use FreePic2Pdf to convert the output images to PDF. In order to have the feeling of PPT when viewing, set the PDF options in freepic2pdf as shown in the right figure.



There is no need for OCR in PPT, so do not select "OCR to make 2-layer PDF"

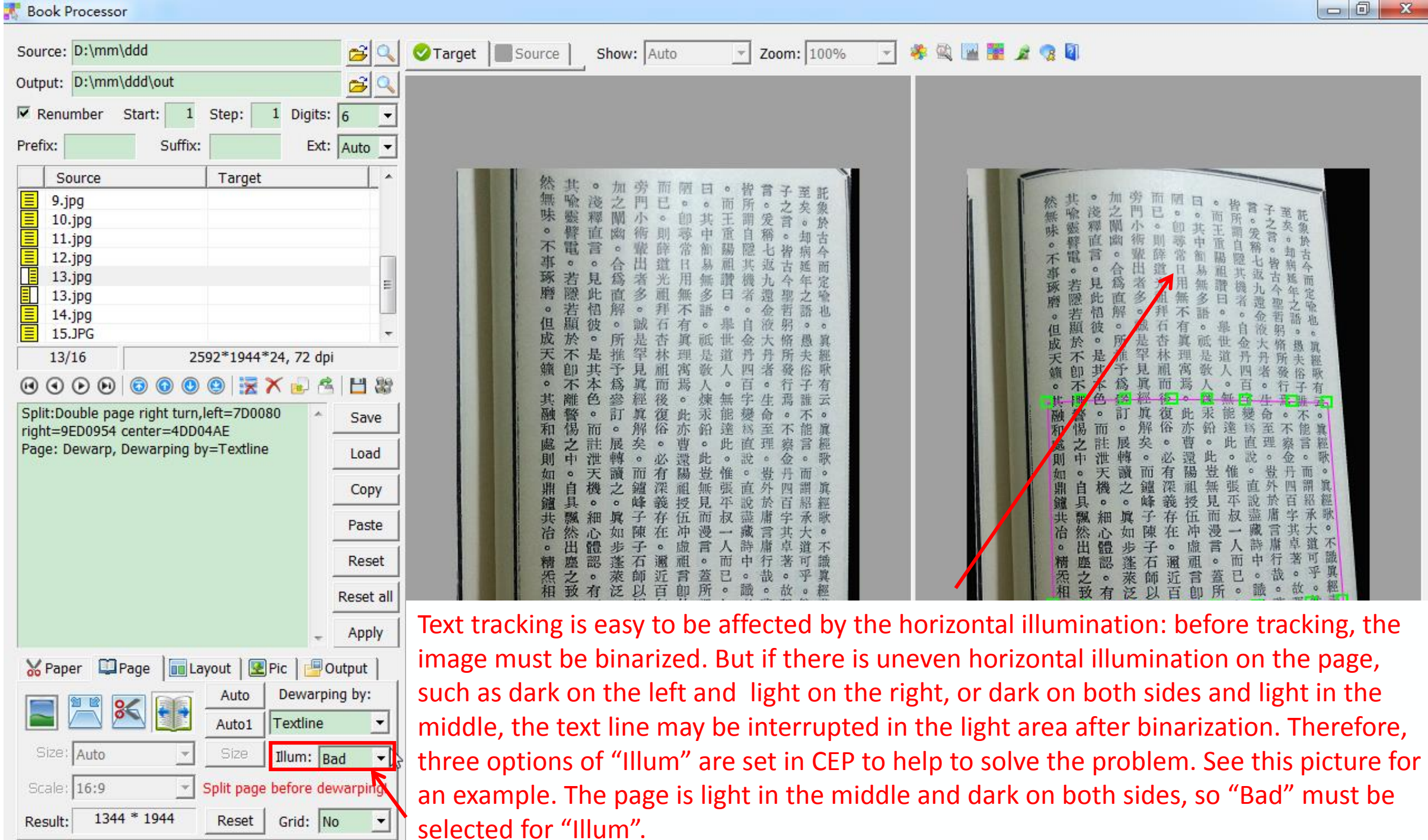
Then, you can enjoy PPT in PDF browser. Full screen mode to get more PPT feeling.



C. Dewarping (double page)

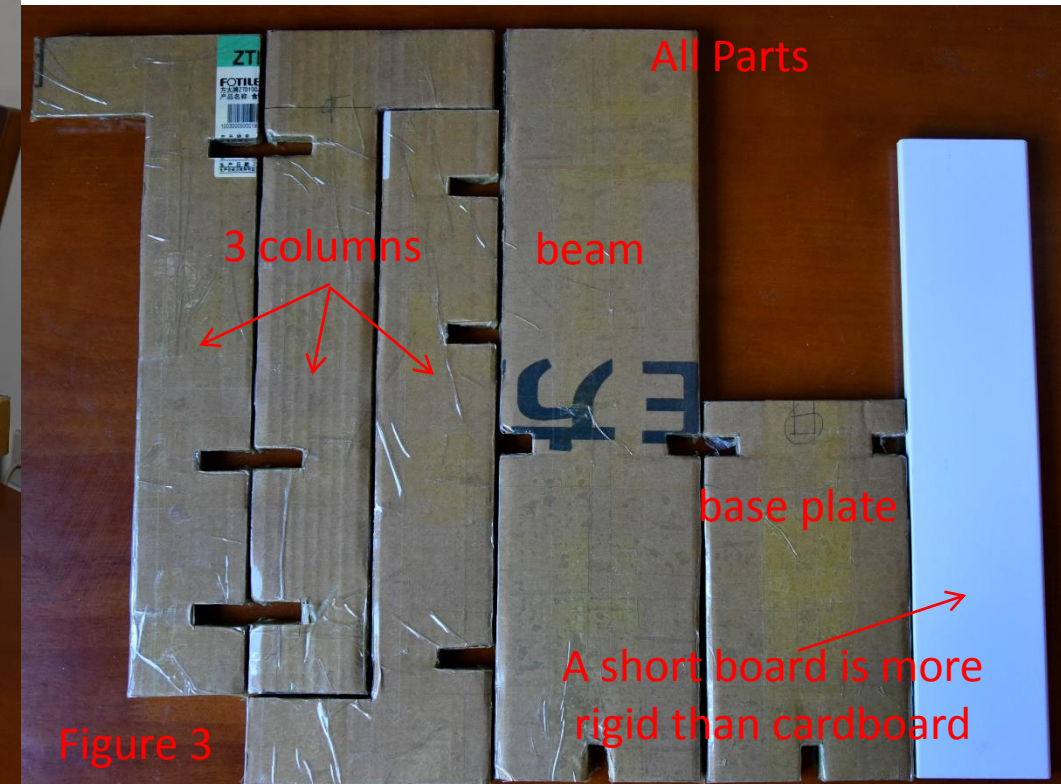
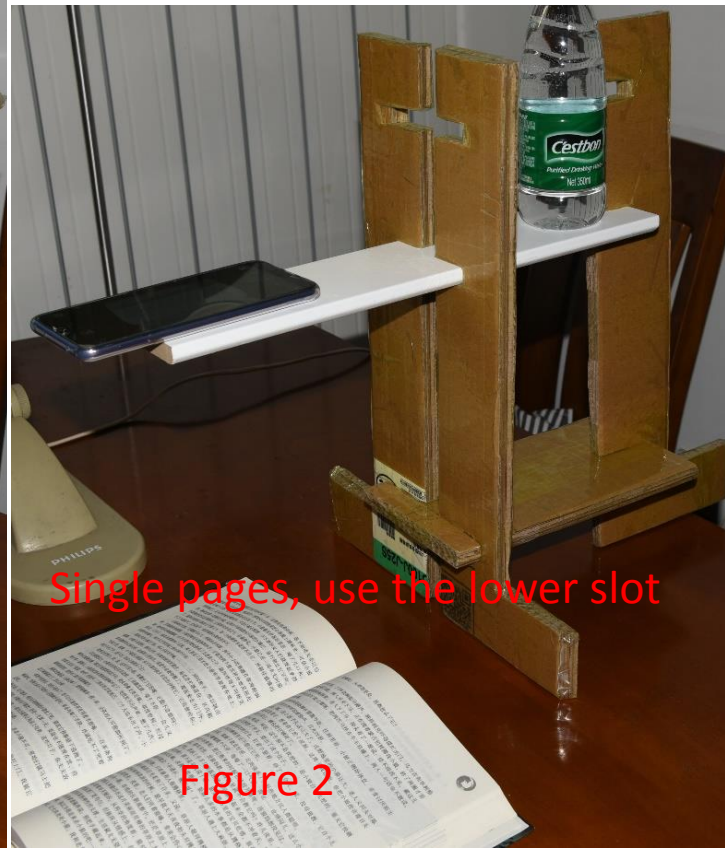
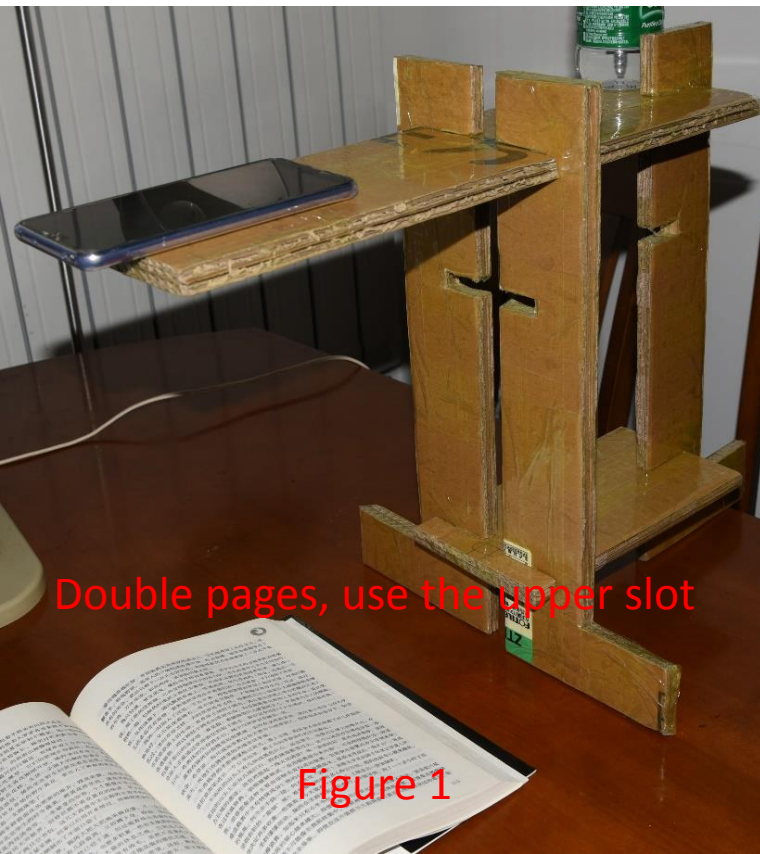
- Since V5.00, CEP has provided dewarping function in the "book processor" interface.
- Before dewarping, you need to split pages first (find the left and right vertical lines). So the left and right boundaries and the middle seam of pages are required to be clear and complete.
- CEP's dewarping is model-based. Model parts: the upper and lower horizontal curves representing the warping of the page, and the left and right vertical boundary lines representing the range of the page content.
- Any model-based auto flattening method can't guarantee complete flattening. So even with the auto dewarping function, you'd better flatten the page and then shoot it.

- There are three ways to automatically dewarp pages with CEP:
 1. **Textline extended**: Get horizontal curves from text lines, and get the left and right boundaries from the endpoints of curves, then get the top and bottom edge curves of the page within the left and right boundaries as a supplement to the text line curves. That means, page edge curves depends on the text line curves.
 2. **Textline**: Get horizontal curves from text lines, then get the left and right boundaries from the endpoints of text line curves. So it doesn't require page edges to be complete or clear.
 3. **Page edge**: Just trace the top and bottom edges of the page, then get the left and right boundaries from the curves' shape. So it don't care about the content of page, just require page edges to be intact. This chapter takes "Textline extended" as an example to show how to flatten it.
- The above two methods, Textline extended and Textline, are only applicable to the case that the content in the page is full of long horizontal text lines. If the page contains more illustrations, or text lines are vertical (CJK), or text lines are not enough, not long, not neat, it is not applicable.

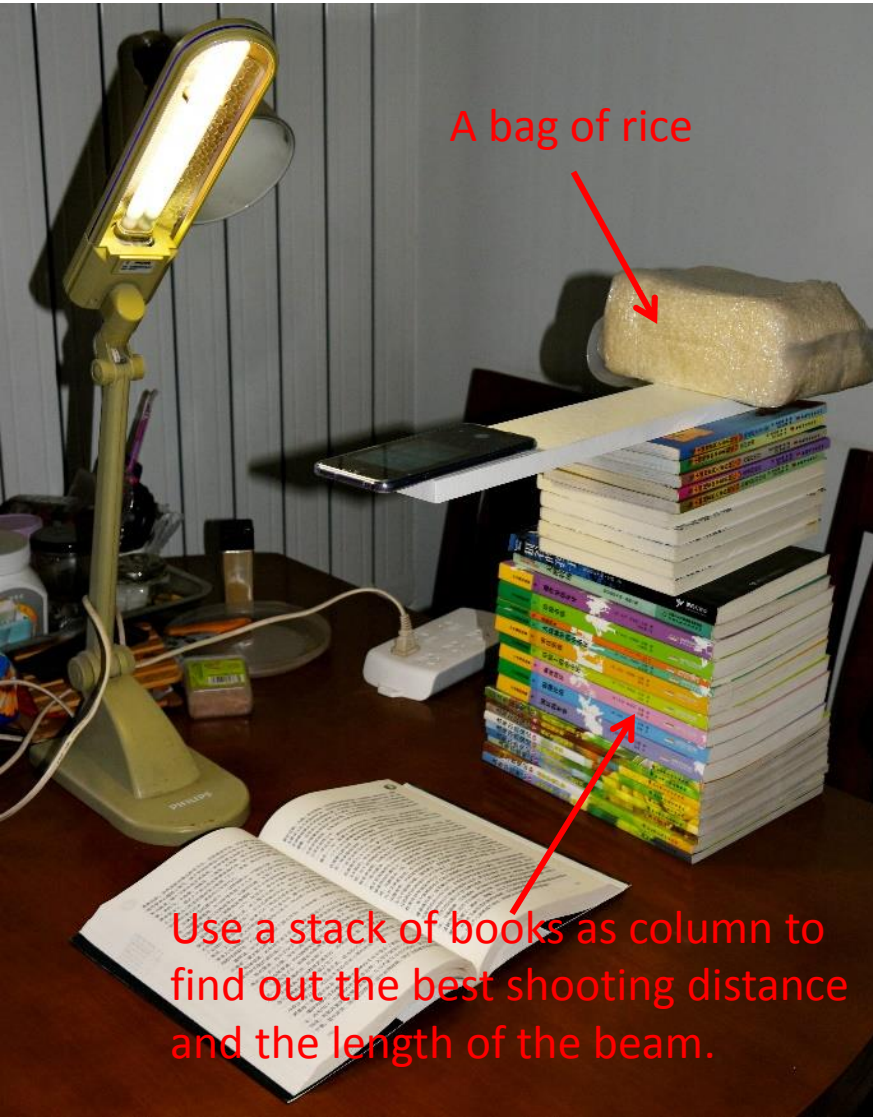


The bargain-price DIY scanner used for this chapter's example

- It can adapt to double page joint shooting and single shot. See Fig 1 and Fig 2.
- Total 5 parts are glued with double layers of cardboard removed from a packing box: 3 columns, 1 beam and 1 base plate. See Fig 3.
- Before design, use a stack of books as column to find out the best shooting distance (slot height) and the length of the beam to shoot sixteenmo double and single pages.
- If only single page shooting is considered, the overall size can be reduced, including column height and beam length.
- When in use, proper weight (a bottle of water) should be placed on the base plate to prevent it from leaning forward.



More DIY scanners tried by myself

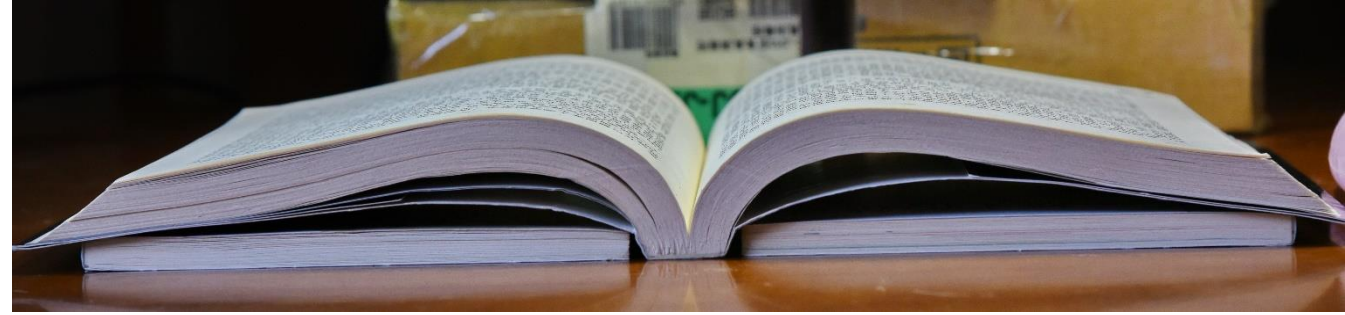


Cut a hole in the cardboard and stick out Canon G16 lens

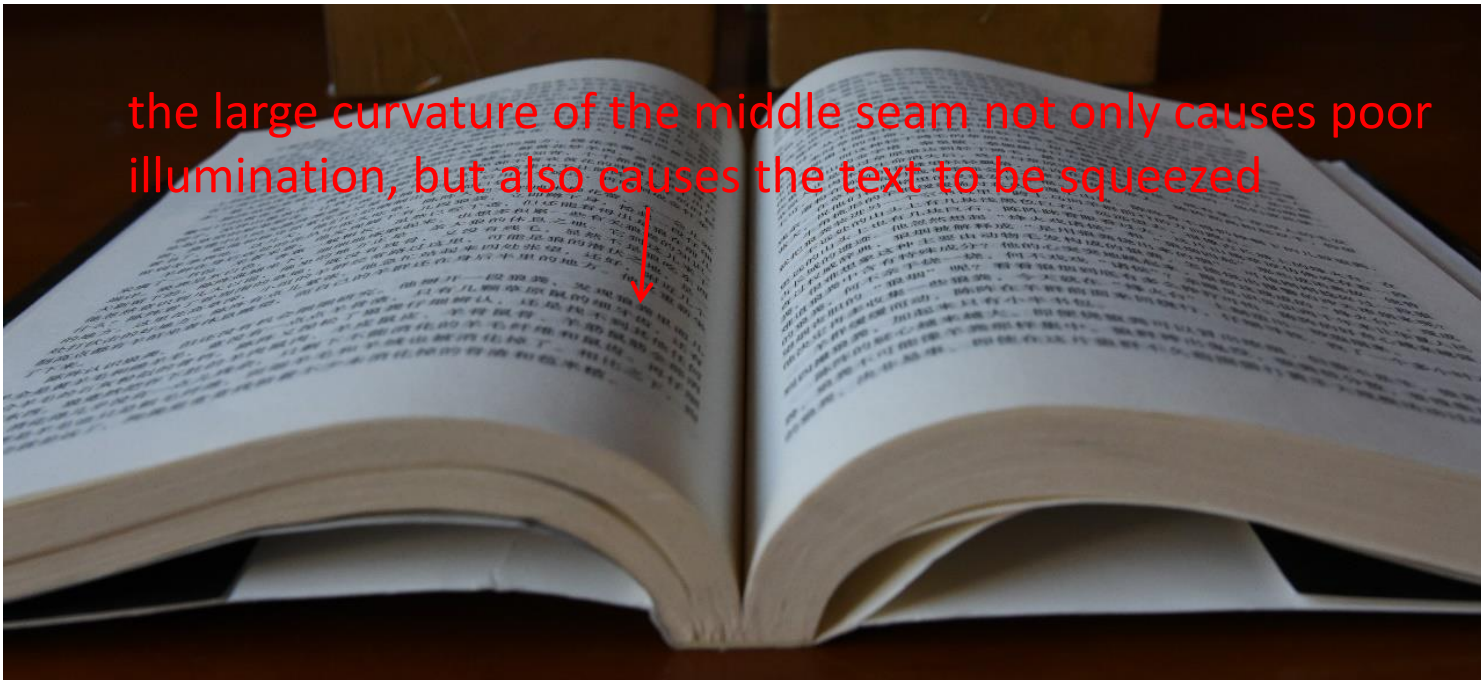
Sample shooting tips

- When the thick book is spread on the table and photographed directly, the large curvature of the middle seam not only causes poor illumination, but also causes the text to be squeezed.
- Put a small book on both sides of the book. Open your fingers and press pages to reduce the deformation of the middle seam. See the picture above on the right.
- A better solution is to take only one page at a time and set the other page up, as described in the next chapter.

Put a small book on both sides of the book



the large curvature of the middle seam not only causes poor illumination, but also causes the text to be squeezed



生 3 连环(因可马七
生二,红方车路较松

Examples of text squeezed at the middle seam

Source

Processed

御之要着。这一
时间,决定出马争
(如走炮七平九,老
无味),马5进3,黑

Software used to take the sample of this chapter



Open Camera:
<https://opencamera.sourceforge.io/>

Features:

- 1. It can be shot continuously and regularly, or by voice control. The sample of this chapter is shot with it's timer.
- 2. Exposure locking and focus locking can be set respectively, which is very important for single page shooting.
- 3. Photo quality can be selected.

Camera Controls

Face detection

Use face detection instead of focus areas

Timer

Off

Repeat

Unlimited

Repeat mode interval

5s

•••

More camera controls...

•••

Camera preview...

•••

On screen GUI...

Photo and Video Settings

Photo settings...

Video settings

Camera resolution

3648 x 2736 (4:3, 9.98MP)

Image quality

Set the image quality of saved JPEG or WebP photo images (default value is 90%). Has no effect for PNG image format.

98%

Image format

Select the file format used for saving photos. This affects "standard" (not RAW) photos. Note that PNG format is not truly lossless, instead it is converted from a JPEG at 100% quality.

JPEG

Save all images for HDR m...

If enabled, when using HDR photo mode, the three base exposure images will be saved as well as the final HDR photo. Note this will make saving slower, especially if options like "Stamp photos" or Auto-level are also used.

HDR contrast enhancement

Image Processing Tips

Compared with the processing of color illustrated books in the next chapter, the processing of plain text or half-tone pages has the following features:

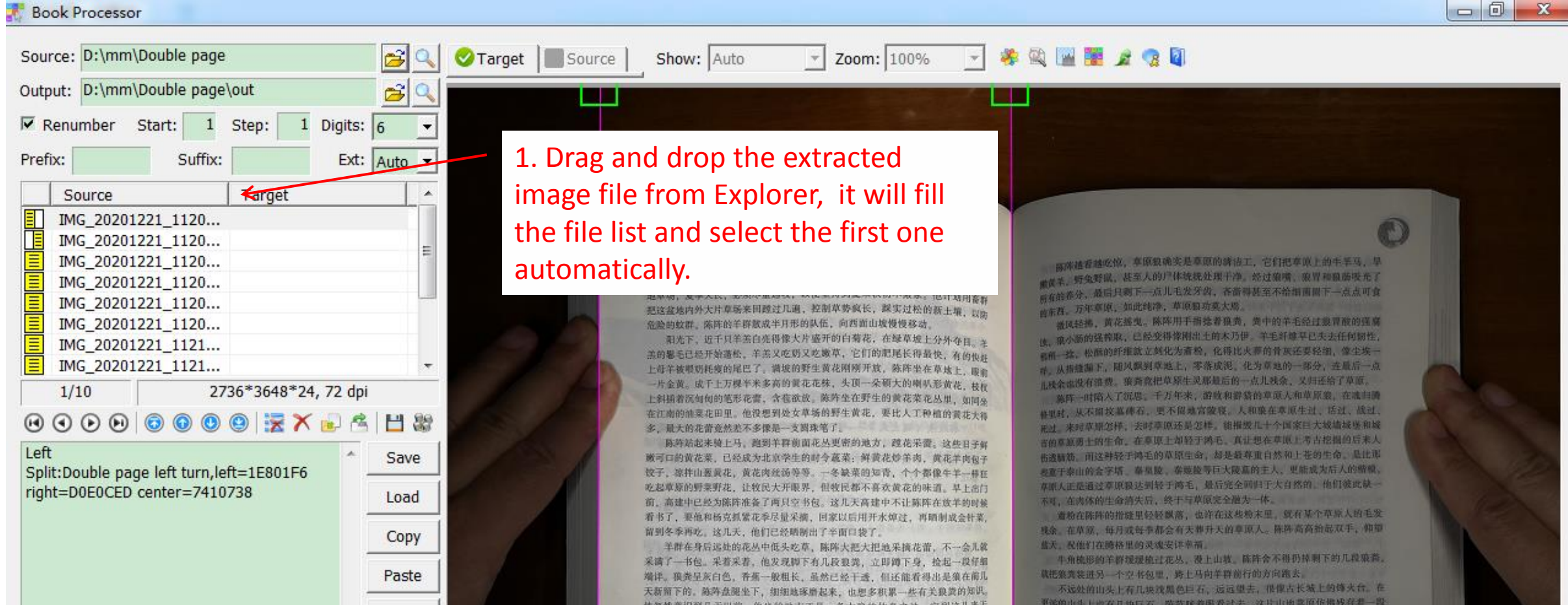
1. The final result is to be processed into a pure black and white (binary) image, which not only makes the image look clear and sharp, but also uses the efficient lossless image compression algorithm for binary image (CCITT G4) to obtain a smaller file length.
2. The image resolution should be processed (actually enlarged) to 600 DPI or more to make the pixel width of the image to be far more than that of the common screen. So when you view result images with "fit for page width" on the screen, the display is actually shrunk and the intermediate gray levels will be automatically added, making the text and lines look more nature.
3. The binary image should be saved as a TIFF file compressed by CCITT G4. Even after being enlarged, the length of the file is smaller than the gray JPG file of the original picture size.
4. Pure text books also hope to obtain text through OCR, so the standard to measure the quality of image processing is often the accuracy of OCR after processing.

Prepare for example

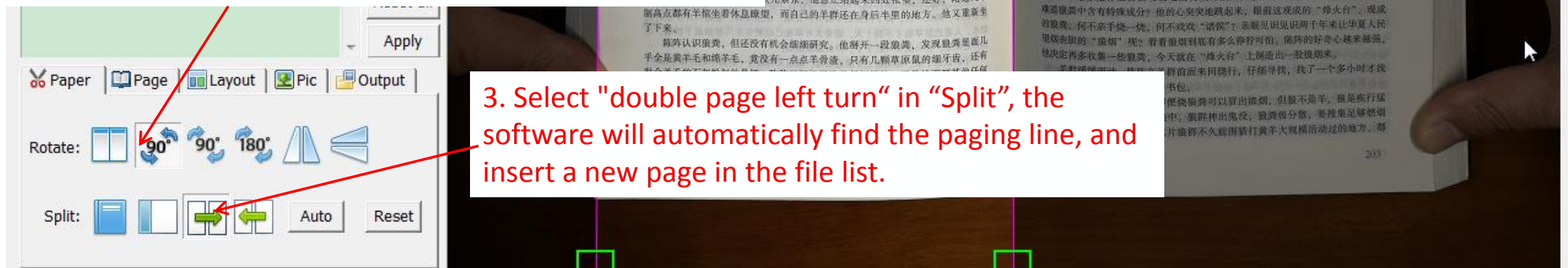
1. Download ComicEnhancerPro_D&D_Examples.zip from my net disk.
2. Unzip it and you'll see "Double page" folder that the example images of this chapter in.
3. You can first look at "out.pdf", compare it with the original photo.
4. Double click "CEP_Processor" icon on the desktop to start CEP, and enter the book processor interface.

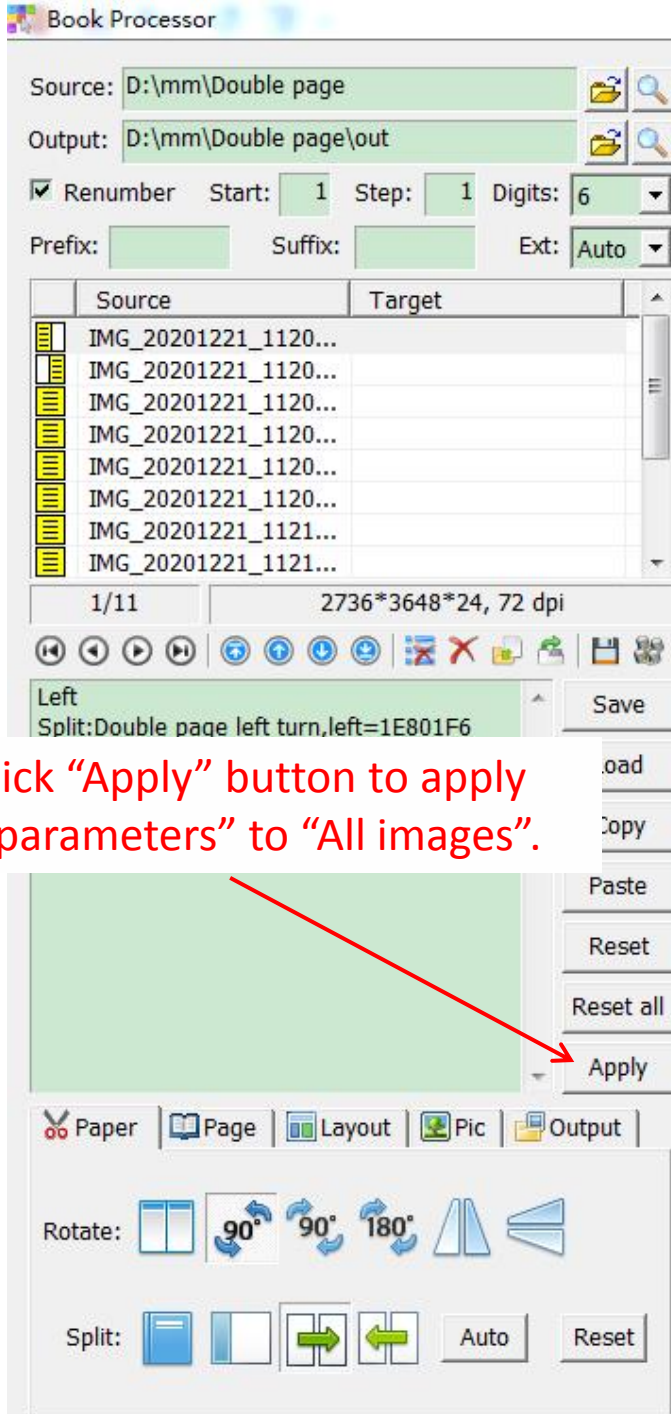
Double click this icon on the computer desktop to start CEP, and enter the book processor interface.



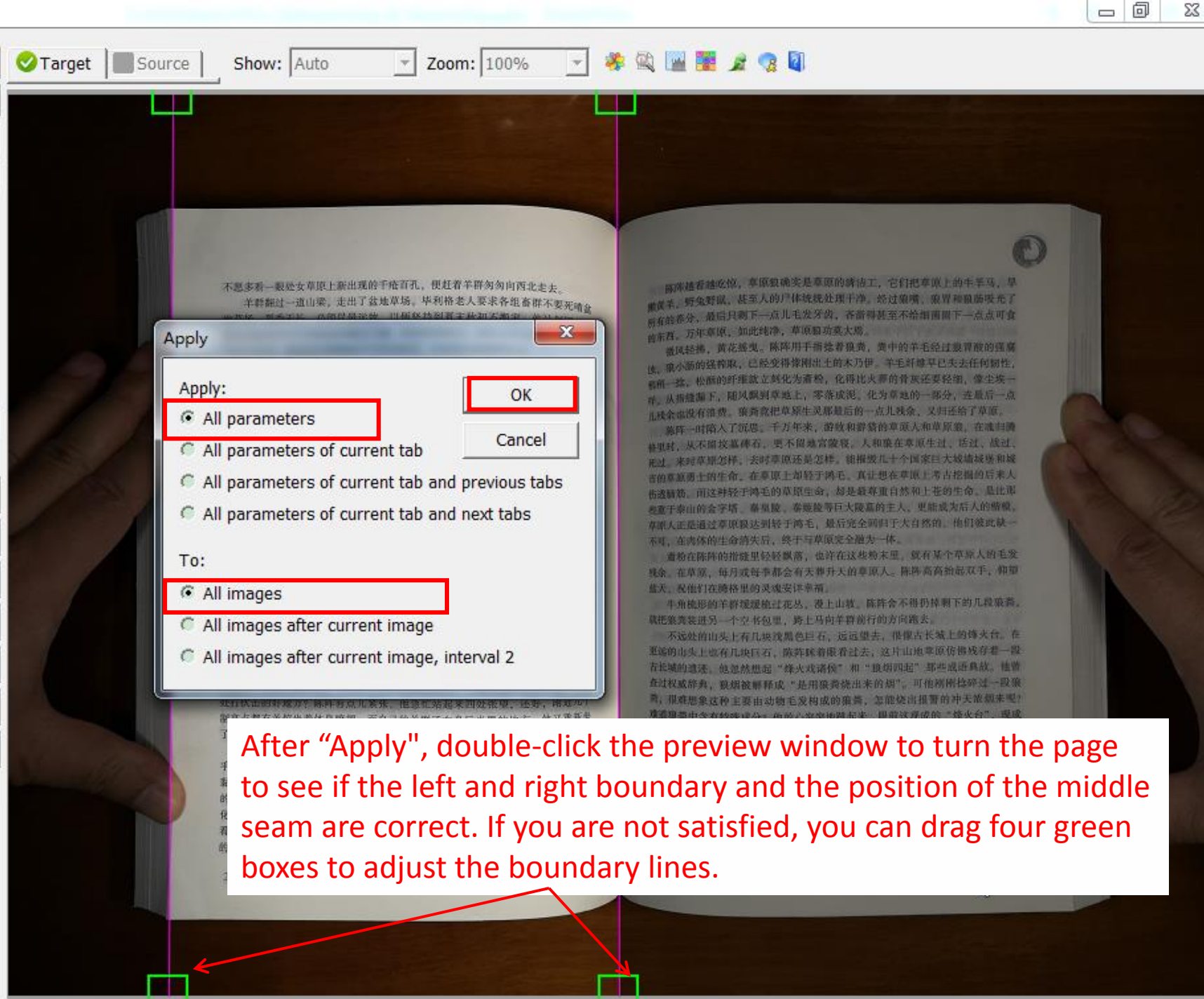


2. Click "Rotate left" to turn the page in the correct direction.





4. Click "Apply" button to apply "All parameters" to "All images".



Source: D:\mm\Double page

Output: D:\mm\Double page\out

☒ Renumber Start: 1 Step: 1 Digits: 6

Prefix: Suffix: Ext: Auto

Source	Target
IMG_20201221_1120...	
IMG_20201221_1120...	
IMG_20201221_1120...	
IMG_20201221_1120...	
IMG_20201221_1120...	
IMG_20201221_1120...	
IMG_20201221_1120...	

1/11

2736*3648*24, 72 dpi



Left
Split:Double page left turn,left=1E801F6
right=D0E0CED center=7410738
Page: Dewarp, Dewarping by=Textline
extended

Save

Load

Copy

Paste

Reset

5. Click "Page" tab.

6. Select "dewarp".

Paper Page Layout Pic Output

Auto Dewarping by:

Auto1 Textline extend

Size: Auto

Scale: 16:9

Result: 1370 * 2736

Split page before dewarping!

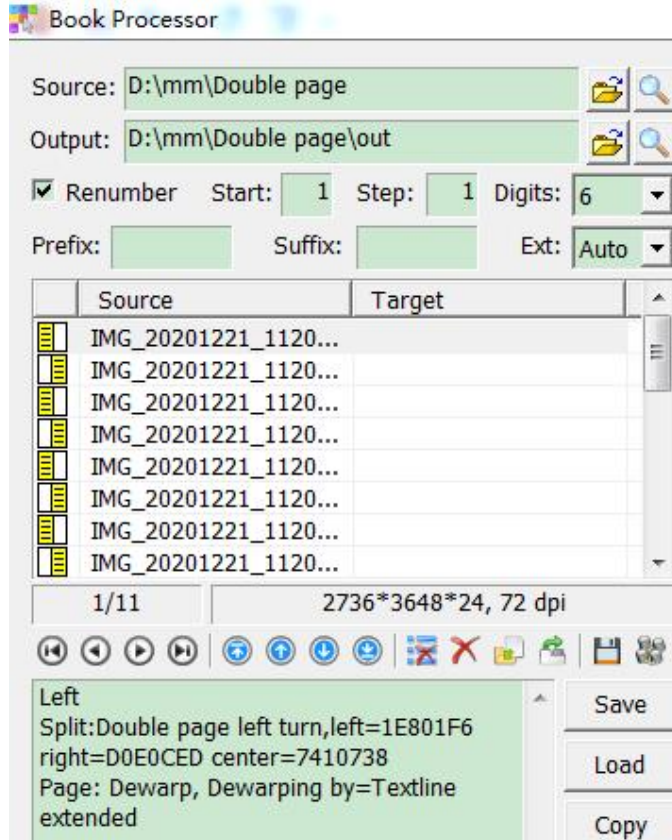
Reset Grid: No

dewarped result

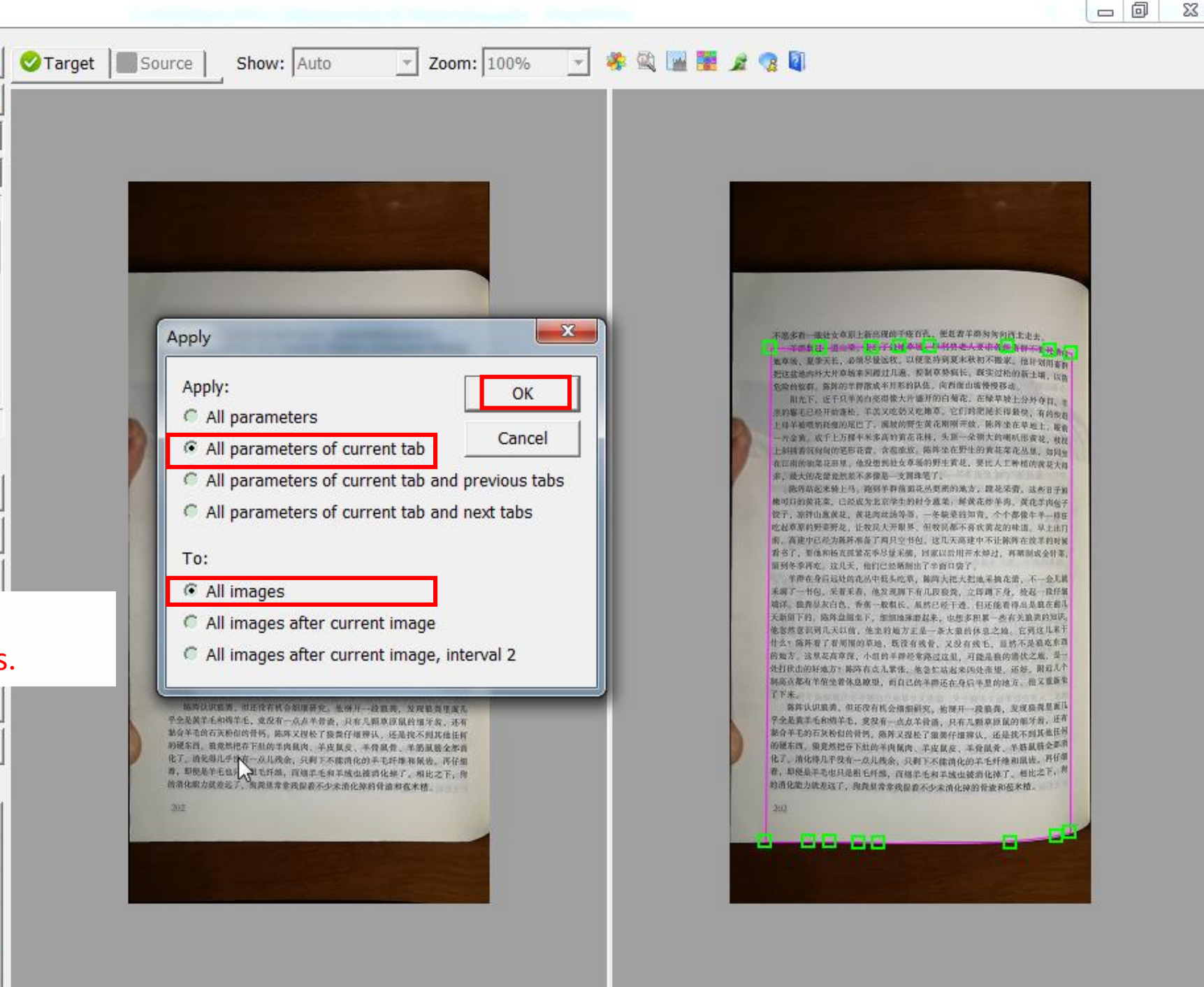
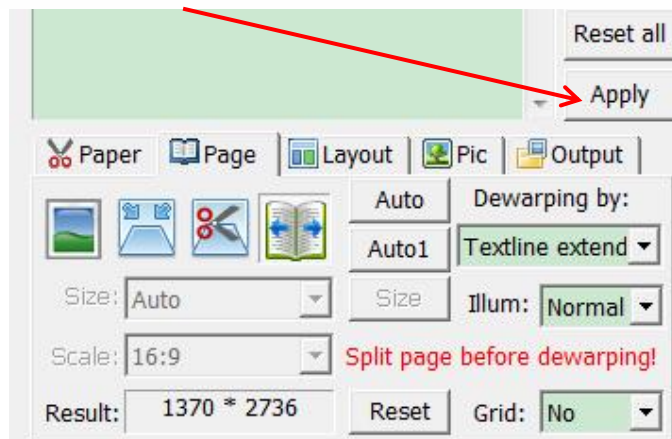
Pink frame is the warp model, and green boxes are draggable control points.

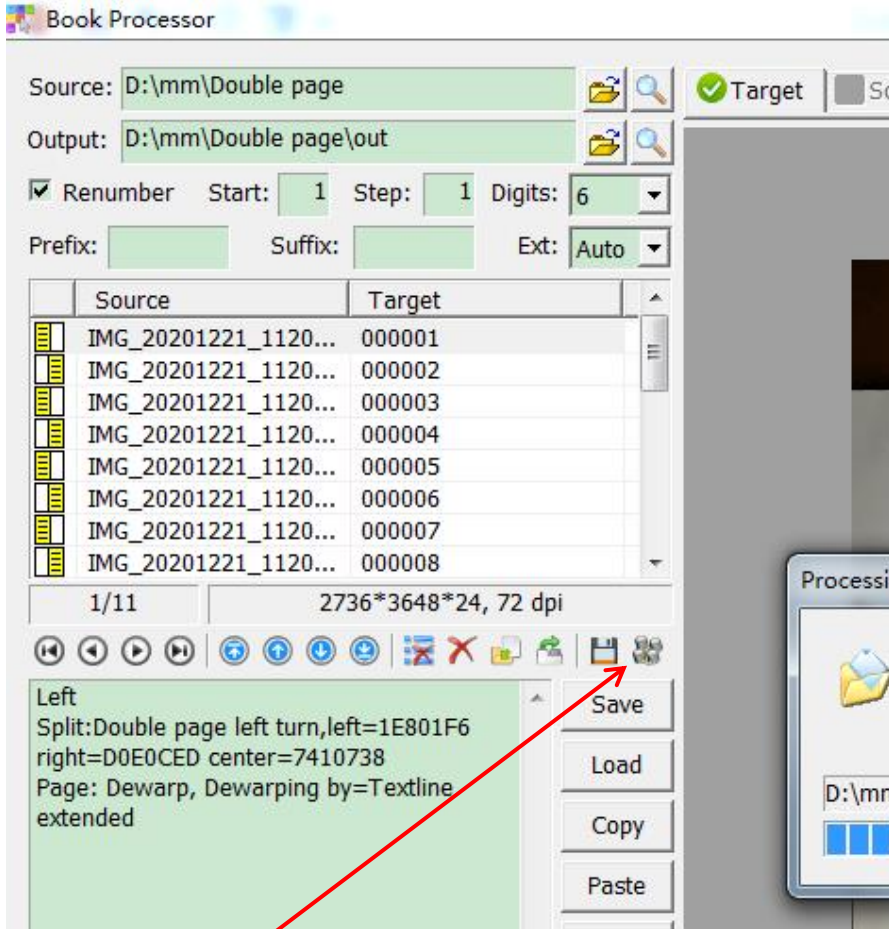
7. Example pictures are pure text pages with complete top and bottom boundaries. So select "Textline Extended" for "Dewarping by".

8. Since there is no obvious light and shade in the horizontal direction, "Illum" can be selected as "Normal".



9. Click "Apply" button to apply the parameters of current tab to all pages.





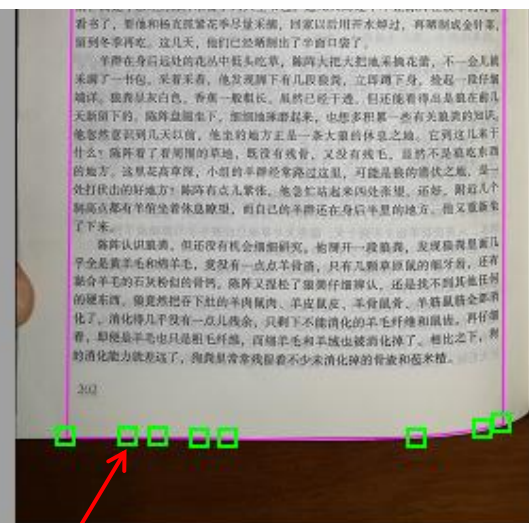
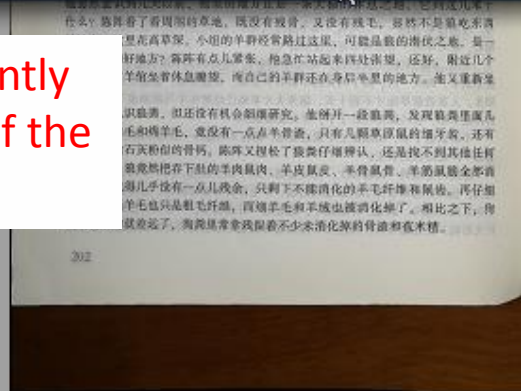
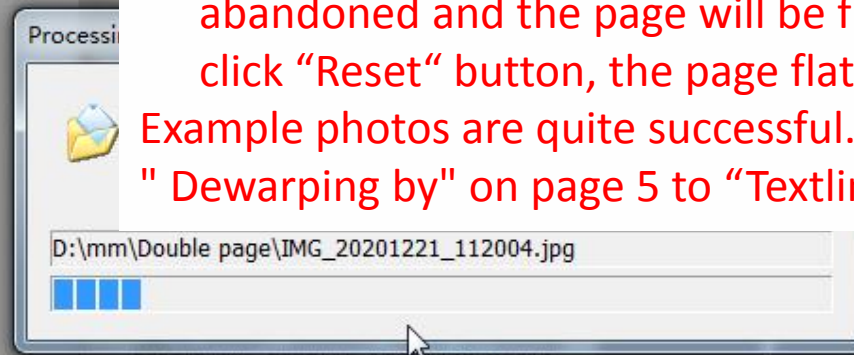
10. Click "Batch Process" button, and then patiently wait for CEP task on the taskbar at the bottom of the desktop to fill the green progress bar.



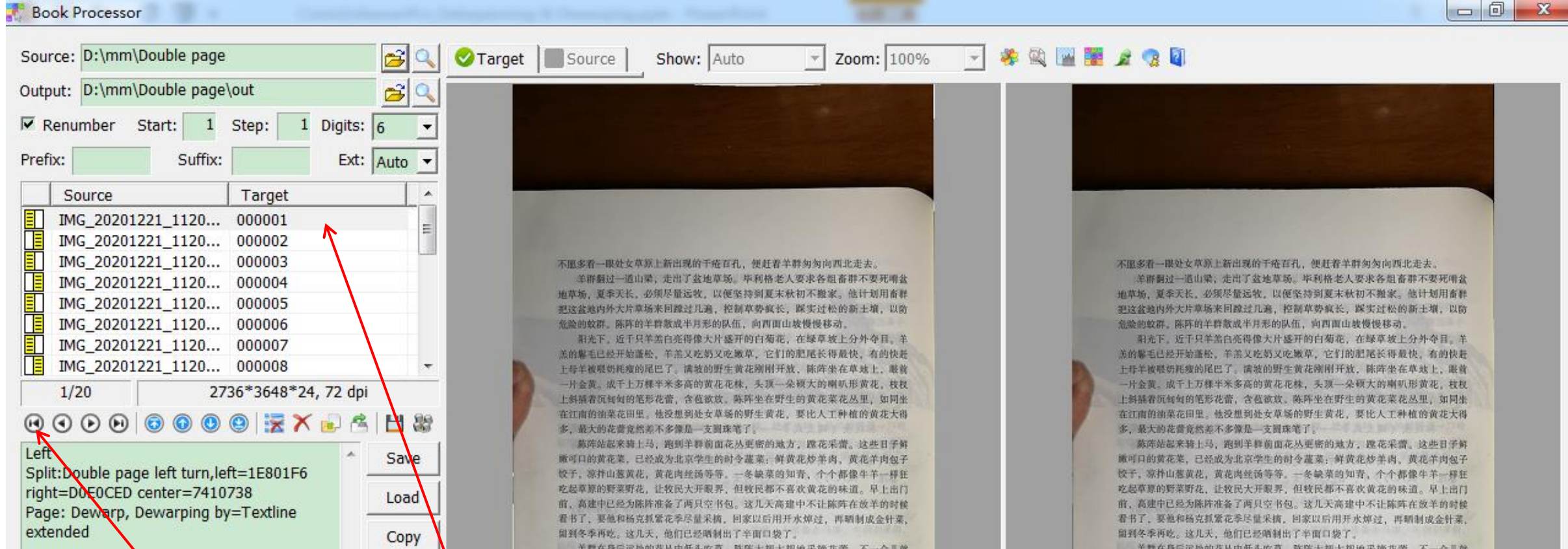
11. Turn forward to see the flattening effect of all pages. If you are not satisfied with it, adjust it manually

- Change "Illum" or "Dewarping by" options, or manually drag the green boxes to adjust the curve.
- If only the left and right boundary lines are in the wrong position, drag the green box at the end of the curve to adjust the boundary, and then click "Auto 1" button to find the curve again within the specified left and right boundary range.
- If you click "Auto" button at any time, the manual adjustment will be abandoned and the page will be flattened automatically again. If you click "Reset" button, the page flattening will be cancelled.

Example photos are quite successful. I looked back and forth, only changed "Dewarping by" on page 5 to "Textline".

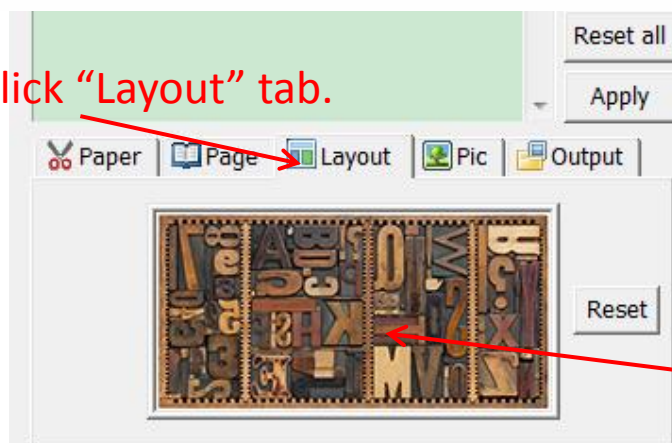


Drag green boxes to change the curve.



12. Click the "First file" button on toolbar to return to the first page in the file list.

13. Click "Layout" tab.



14. Click the big icon to open "crop" dialog box.

Generally, deskew is no longer necessary after dewarping.

16. According to the size in the book copyright page, select "page size" and set the target DPI to 600.

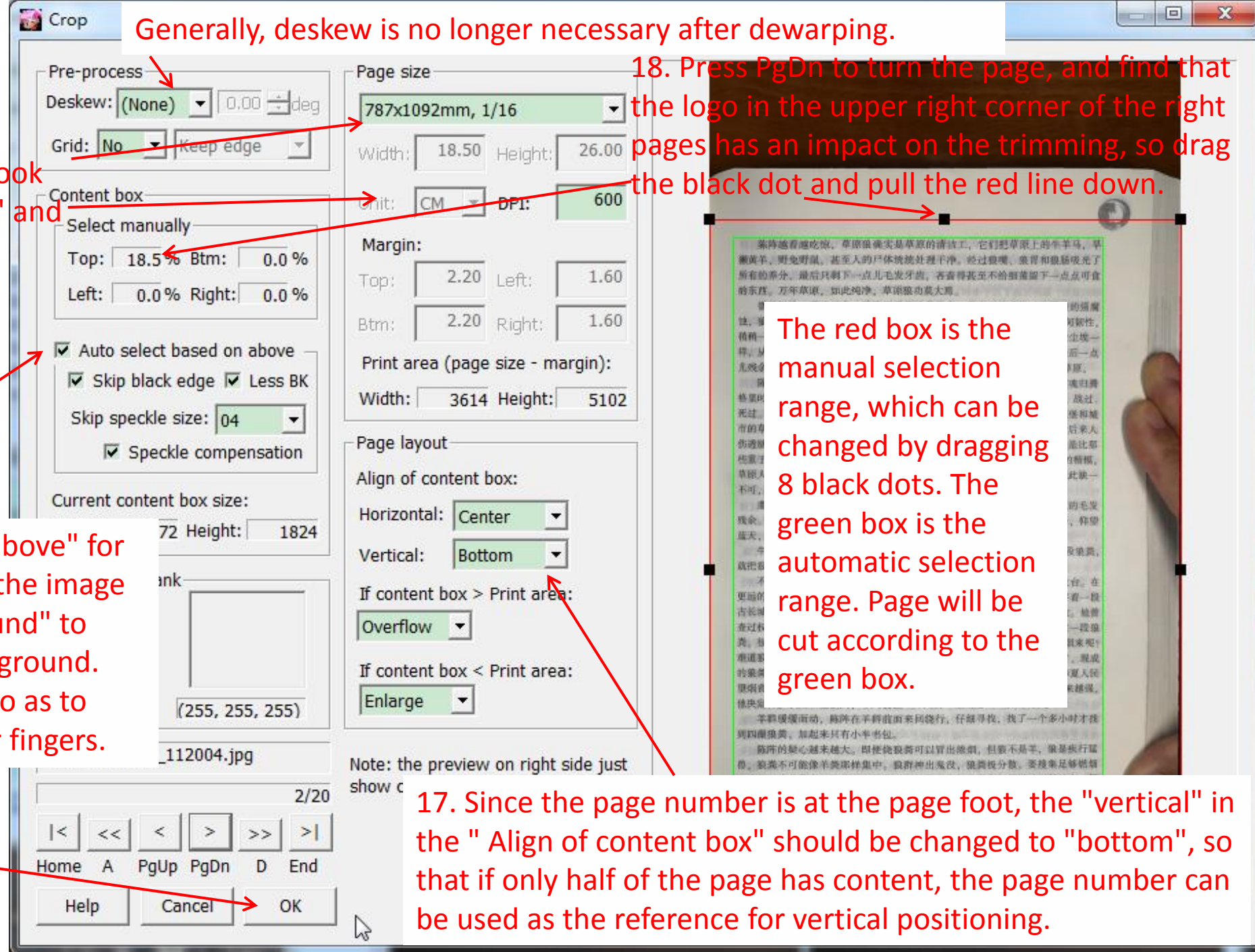
18. Press PgDn to turn the page, and find that the logo in the upper right corner of the right pages has an impact on the trimming, so drag the black dot and pull the red line down.

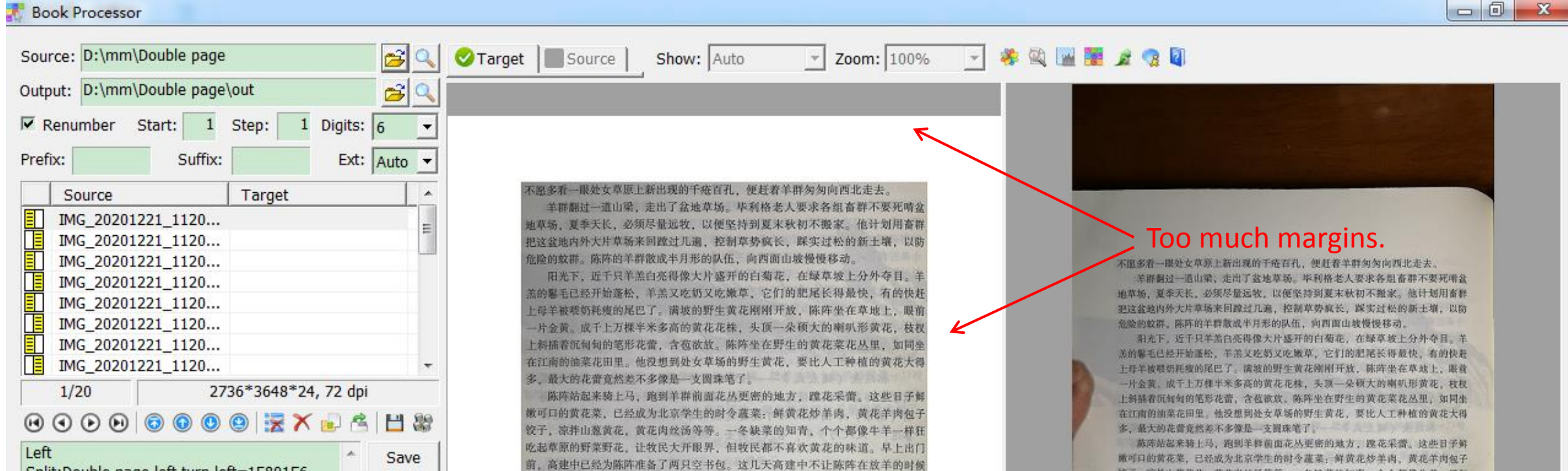
15. Check "Auto select based on above" for automatic edge cutting. Because the image light is dark, check "Less background" to avoid the influence of paper background. Change "Skip speckle size" to 4, so as to avoid too much compensation for fingers.

The red box is the manual selection range, which can be changed by dragging 8 black dots. The green box is the automatic selection range. Page will be cut according to the green box.

19. Click "OK" to exit.

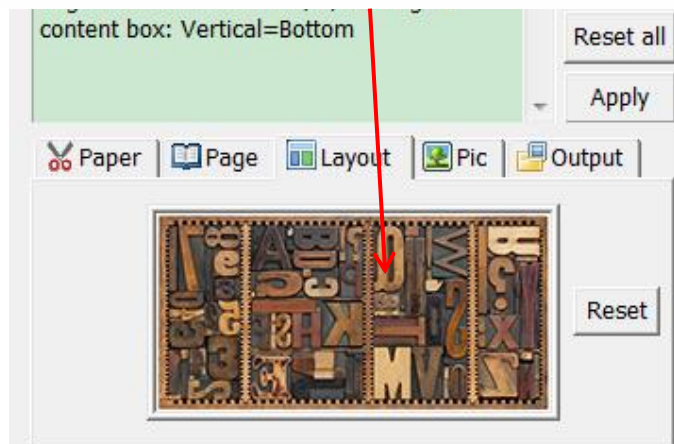
17. Since the page number is at the page foot, the "vertical" in the "Align of content box" should be changed to "bottom", so that if only half of the page has content, the page number can be used as the reference for vertical positioning.

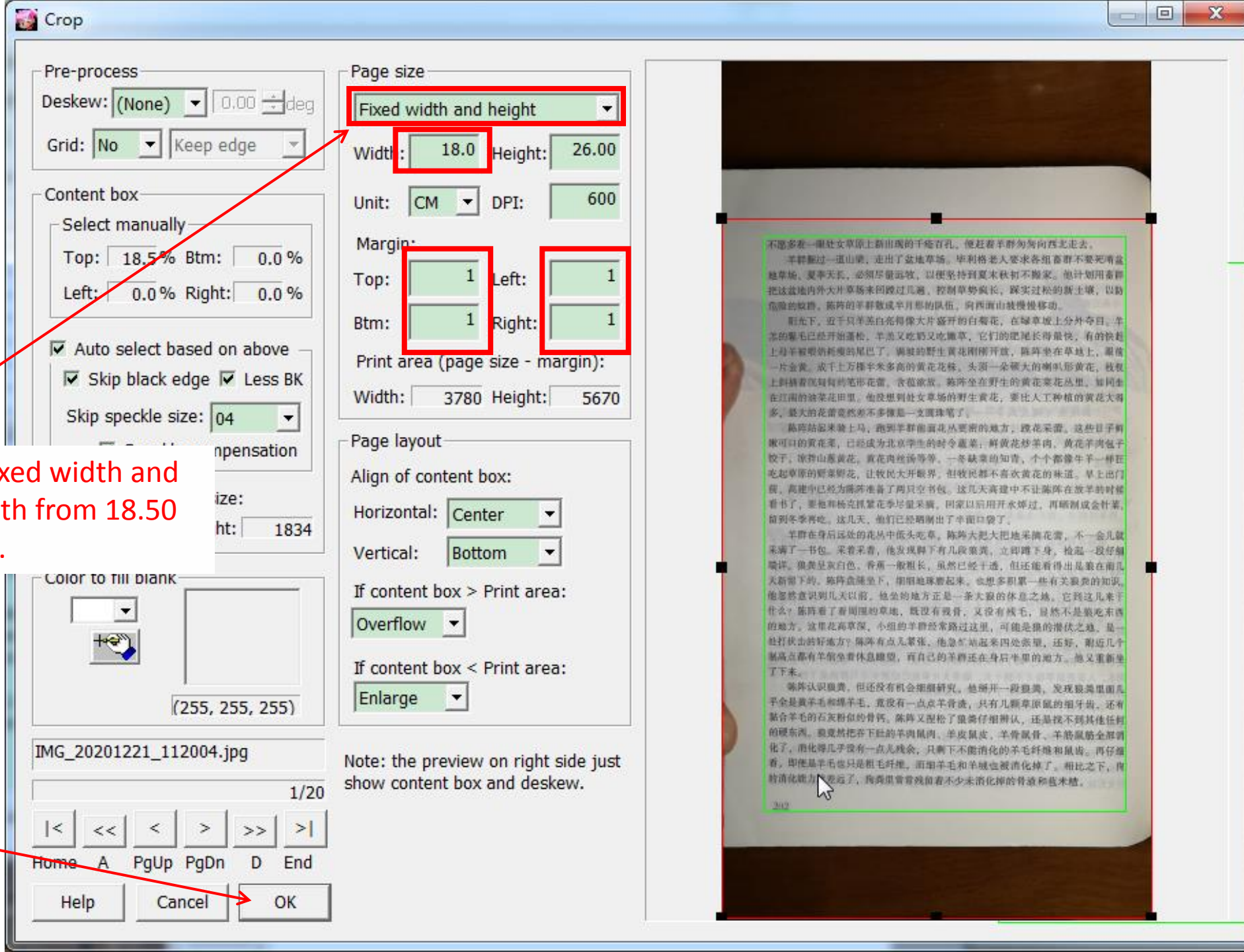




Too much margins.

20. Look at the effect after clicking OK and find that there are too much margins. Click the big icon again to open the "Crop" dialog box to modify the margins.





21. Change "page size" to "Fixed width and height", then change the width from 18.50 to 18.0, and all "margin" to 1.

22. Click "OK" to exit.

源文件夹: D:\mm\16开双页_黑白

输出到: D:\mm\16开双页_黑白\out

☒ 重新编号 起始: 1 增量: 1 位数: 6

前缀: 后缀: 扩展名: 自动

源文件	目标文件
IMG_20201221_112...	000001
IMG_20201221_112...	000002
IMG_20201221_112...	000003
IMG_20201221_112...	000004
IMG_20201221_112...	000005
IMG_20201221_112...	000006
IMG_20201221_112...	000007
IMG_20201221_112...	000008
IMG_20201221_112...	000009
IMG_20201221_112...	000010
IMG_20201221_112...	000011
IMG_20201221_112...	000012
IMG_20201221_112...	000013
IMG_20201221_112...	000014

1/20

2736*3648*24, 72 dpi



左旋
分页: 双页左翻, left=1E801F6
right=DOEOCED center=7410738
页面: 弯曲页面展平, 自动展平方法=扩展文
本行
切边: 上=18.5%, 手动选择范围内自动选择,
不计黑边, 强力去背景, 忽略斑点直径: 04,
斑点补偿
DPI=600
页面大小: 指定宽、高, 单位=厘米, 宽度
=18.00, 高度=26.00, 页边空: 上=1.00,
左=1.00, 下=1.00, 右=1.00, 内容框对齐
方式: 垂直=靠下

保存

调入

复制

粘贴

恢复

全部恢复

应用

纸张 | 页面 | 版面 | 图像 | 输出



恢复

☒ 结果☐ 源图

显示方式: 自动

显示比例: 100%



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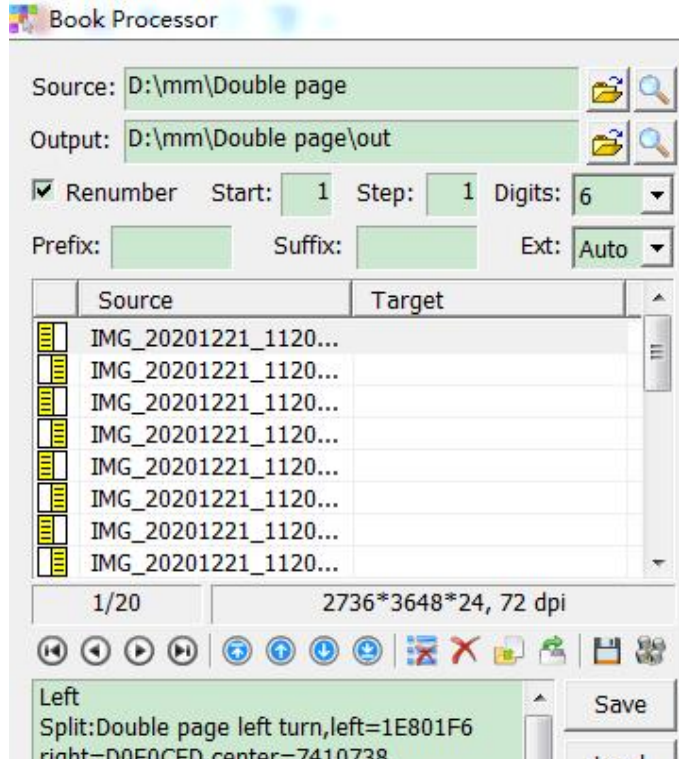
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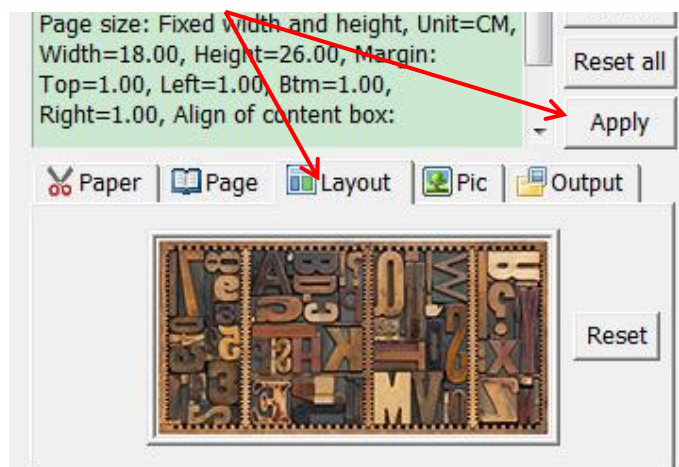
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23. Stay in the "Layout" tab and click the "apply" button to copy the settings of current tab to other images.



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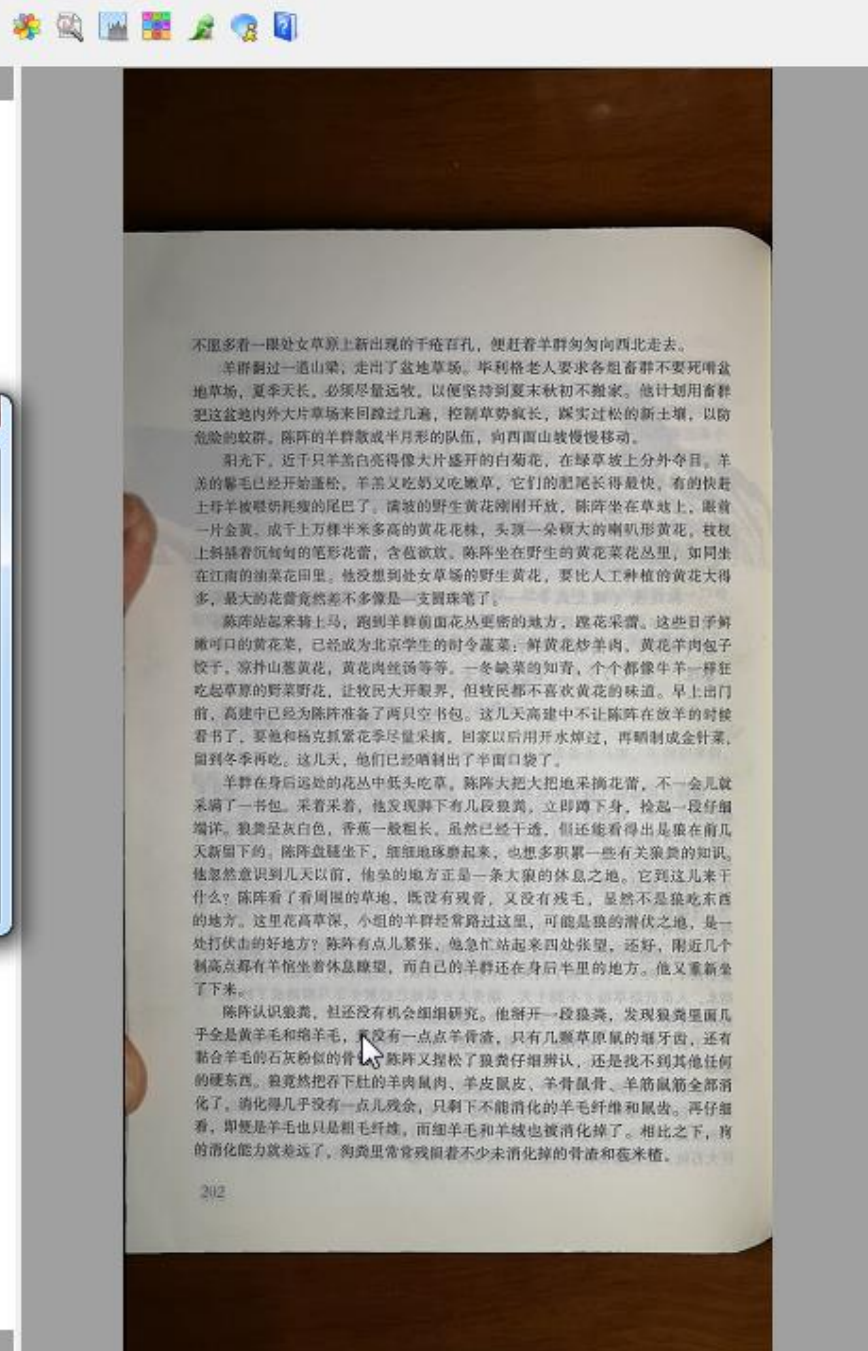
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源文件夹: D:\mm\16开双页_黑白

输出到: D:\mm\16开双页_黑白\out

☒ 重新编号 起始: 1 增量: 1 位数: 6

前缀: 后缀: 扩展名: 自动

源文件	目标文件
IMG_20201221_112...	000008
IMG_20201221_112...	000009
IMG_20201221_112...	000010
IMG_20201221_112...	000011
IMG_20201221_112...	000012
IMG_20201221_112...	000013
IMG_20201221_112...	000014
IMG_20201221_112...	000015
IMG_20201221_112...	000016
IMG_20201221_112...	000017
IMG_20201221_112...	000018
IMG_20201221_112...	000019
IMG_20201221_112...	000020

20/20

2736*3648*24, 72 dpi



左旋
分页: 双页左翻, left=1E80213
right=D420D5F center=77507B8
页面: 弯曲页面展平, 自动展平方法=扩展文
本行
切边: 上=18.5%, 手动选择范围内自动选择,
不计黑边, 强力去背景, 忽略斑点直径: 04,
斑点补偿
DPI=600
页面大小: 指定宽、高, 单位=厘米, 宽度
=18.00, 高度=26.00, 页边空: 上=1.00,
左=1.00, 下=1.00, 右=1.00, 内容框对齐
方式: 垂直=靠下

保存

调入

复制

粘贴

恢复

全部恢复

应用

纸张 | 页面 | 版面 | 图像 | 输出



恢复

24. After "Apply", I flipped back and forth quickly and found that the last page cut off the page number, resulting in half page text down. So on last page, click the big icon again to set the "Crop" parameter of this page separately.

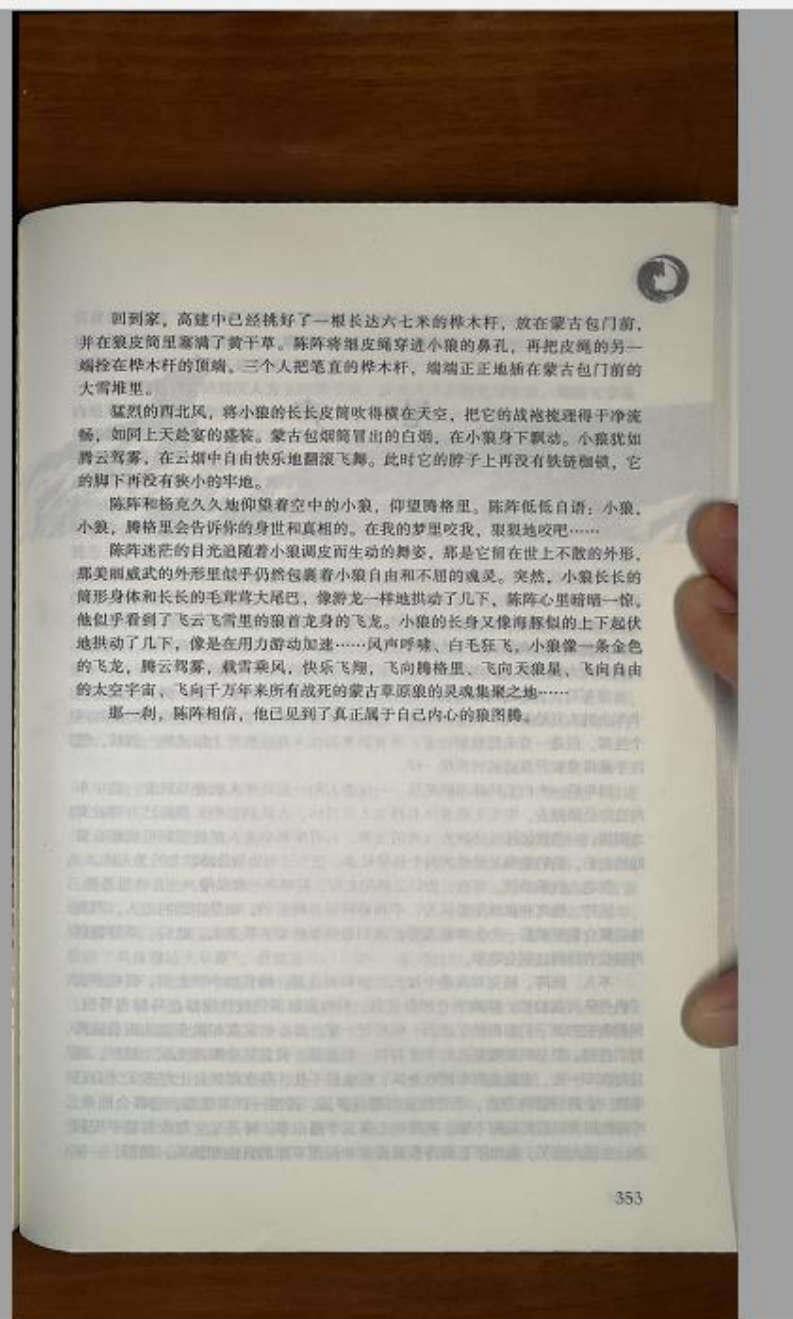
回到家, 高建中已经挑好了一根长达六七米的桦木杆, 放在蒙古包门前, 并在狼皮筒里塞满了黄干草。陈阵将细皮绳穿进小狼的鼻孔, 再把皮绳的另一端挂在桦木杆的顶端。三个人把笔直的桦木杆, 端端正正地插在蒙古包门前的大雪堆里。

猛烈的西北风, 将小狼的长长皮筒吹得横在天空, 把它的战袍梳理得干净流畅, 如同上天赴宴的盛装。蒙古包烟筒冒出的白烟, 在小狼身下飘动。小狼犹如腾云驾雾, 在云烟中自由快乐地翻滚飞舞。此时它的脖子上再没有铁链枷锁, 它的脚下再没有狭小的牢地。

陈阵和杨克久久地仰望着空中的小狼, 仰望腾格里。陈阵低低自语: 小狼, 小狼, 腾格里会告诉你的身世和真相的。在我的梦里咬我, 狠狠地咬吧……

陈阵迷茫的目光追随着小狼调皮而生动的舞姿, 那是它留在世上不散的外形, 那美丽威武的外形里似乎仍然包裹着小狼自由和不屈的魂灵。突然, 小狼长长的筒形身体和长长的毛茸茸大尾巴, 像游龙一样地拱动了几下, 陈阵心里暗暗一惊, 他似乎看到了飞云飞雪里的狼首龙身的飞龙。小狼的长身又像海豚似的上下起伏地拱动了几下, 像是在用力游动加速……风声呼啸, 白毛狂飞, 小狼像一条金色的飞龙, 腾云驾雾, 载雪乘风, 快乐飞翔, 飞向腾格里、飞向天狼星、飞向自由的太空宇宙, 飞向千万年来所有战死的蒙古草原狼的灵魂集聚之地……

那一刹, 陈阵相信, 他已见到了真正属于自己内心的狼图腾。



25. In crop dialog, uncheck the "Less background" option, and drag the black dots on the left and right sides of the red box, to pull the two sides of the red box a little bit inward to ensure that the green box can accurately frame the page content, including the page number. Then click OK to return.

Content box

Select manually

Top: 18.5% Btm: 0.0 %

Left: 3.8 % Right: 4.6 %

☒ Auto select based on above

☒ Skip black edge ☐ Less BK

Skip speckle size: 04

☒ Speckle compensation

Current content box size:

Width: 1195 Height: 1875

Color to fill blank

(255, 255, 255)

IMG_20201221_112204.jpg

20/20

|< << < > >> >|

Home A PgUp PgDn D End

Help Cancel OK

Unit: CM DPI: 600

Margin:

Top: 1.00 Left: 1.00

Btm: 1.00 Right: 1.00

Print area (page size - margin):

Width: 3780 Height: 5670

Page layout

Align of content box:

Horizontal: Center

Vertical: Bottom

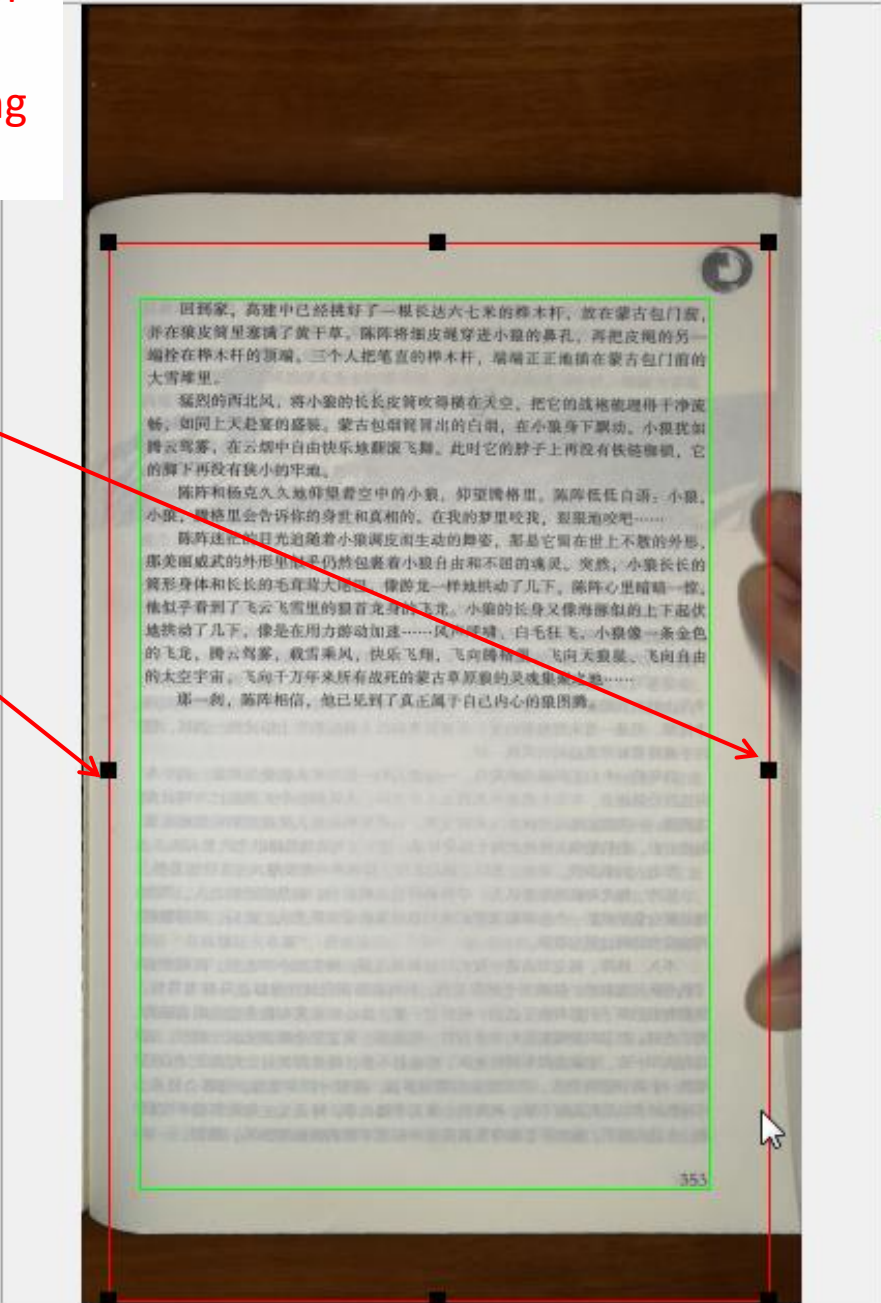
If content box > Print area:

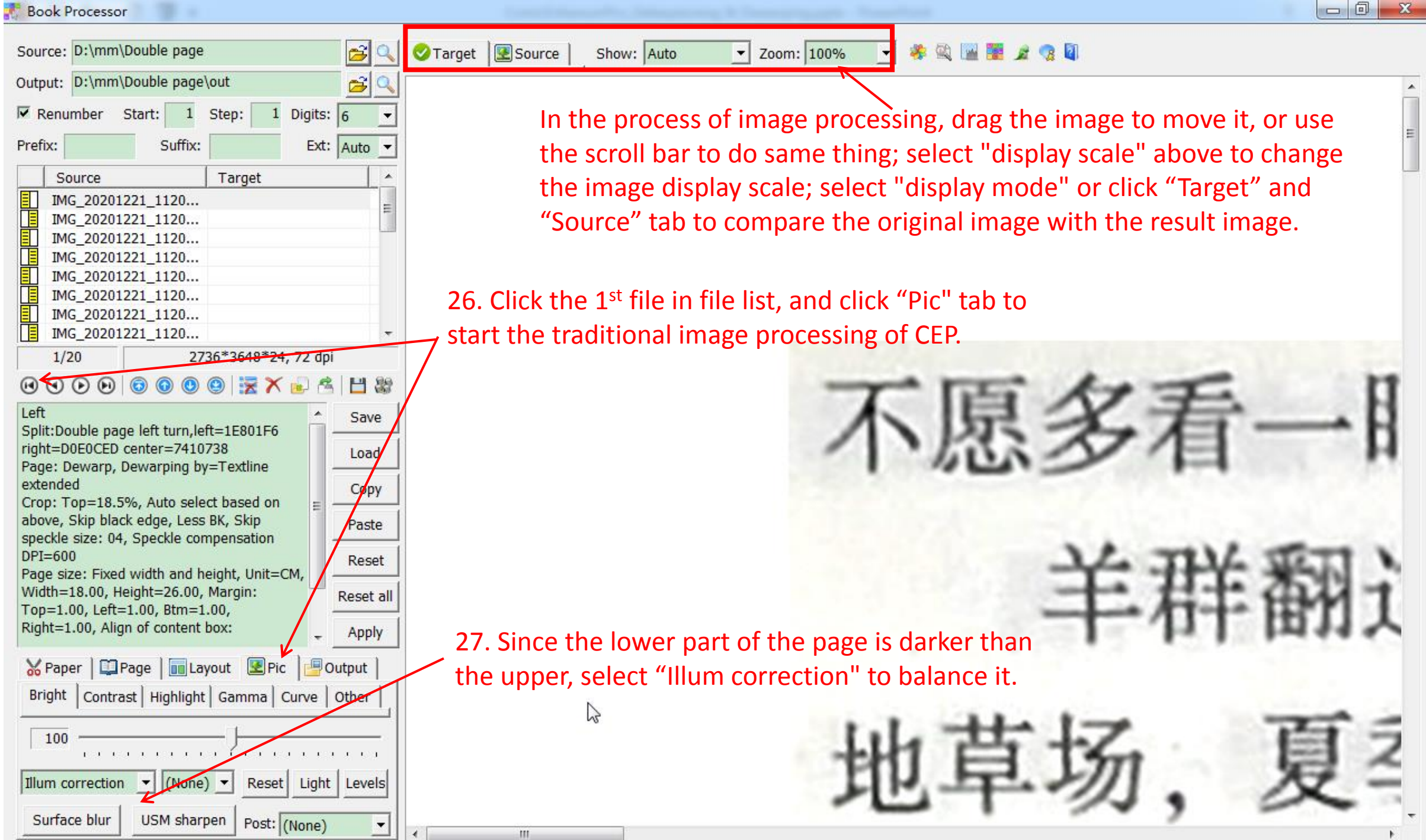
Overflow

If content box < Print area:

Enlarge

Note: the preview on right side just show content box and deskew.

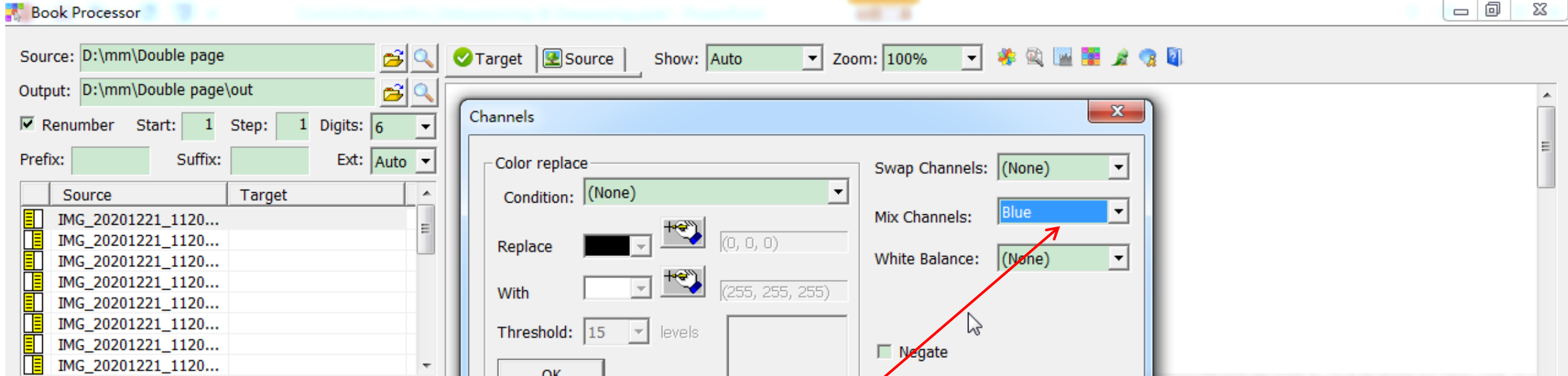




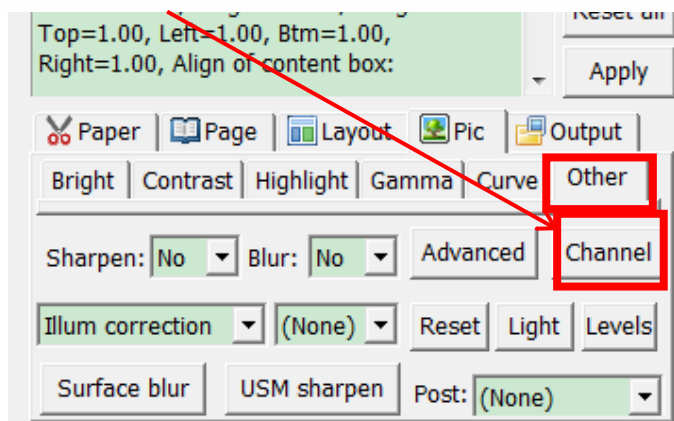
In the process of image processing, drag the image to move it, or use the scroll bar to do same thing; select "display scale" above to change the image display scale; select "display mode" or click "Target" and "Source" tab to compare the original image with the result image.

26. Click the 1st file in file list, and click "Pic" tab to start the traditional image processing of CEP.

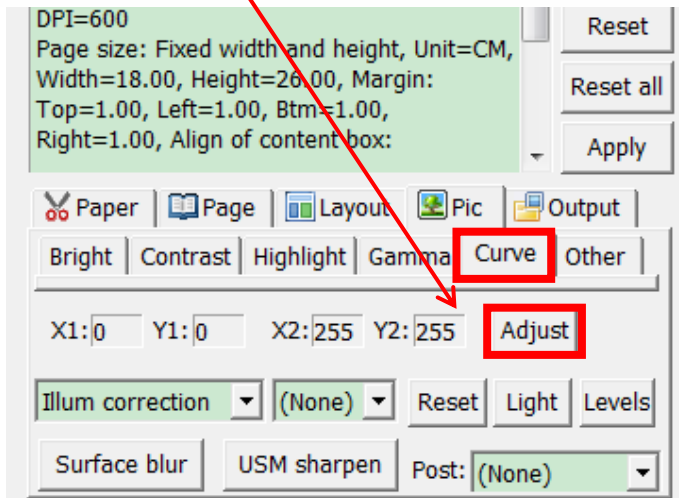
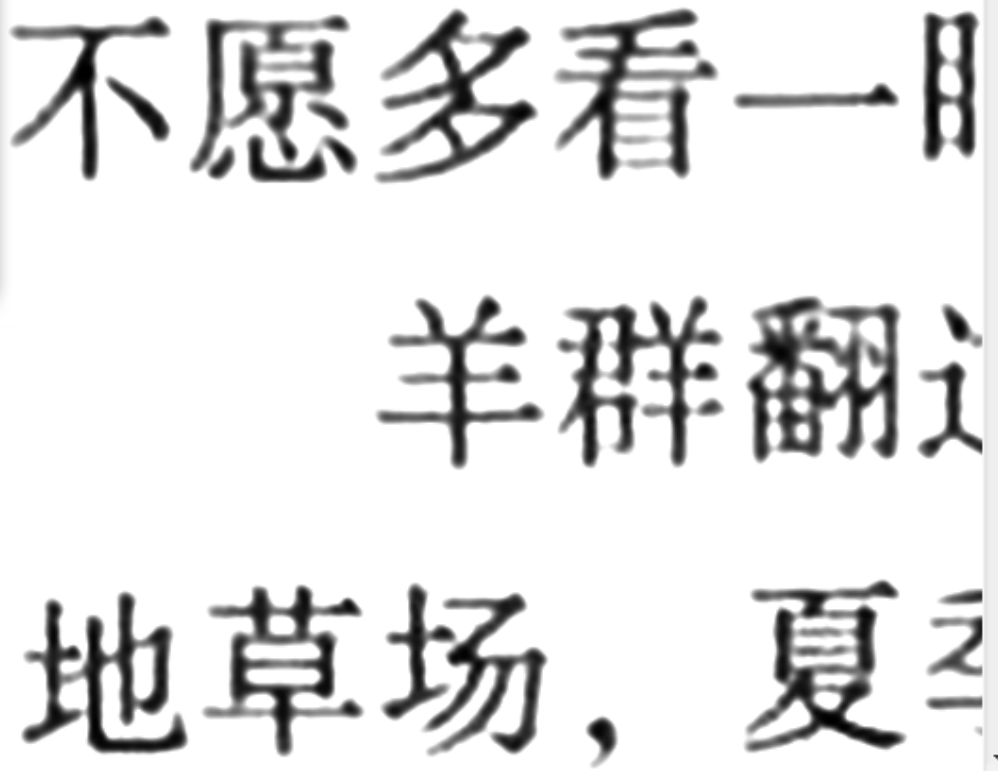
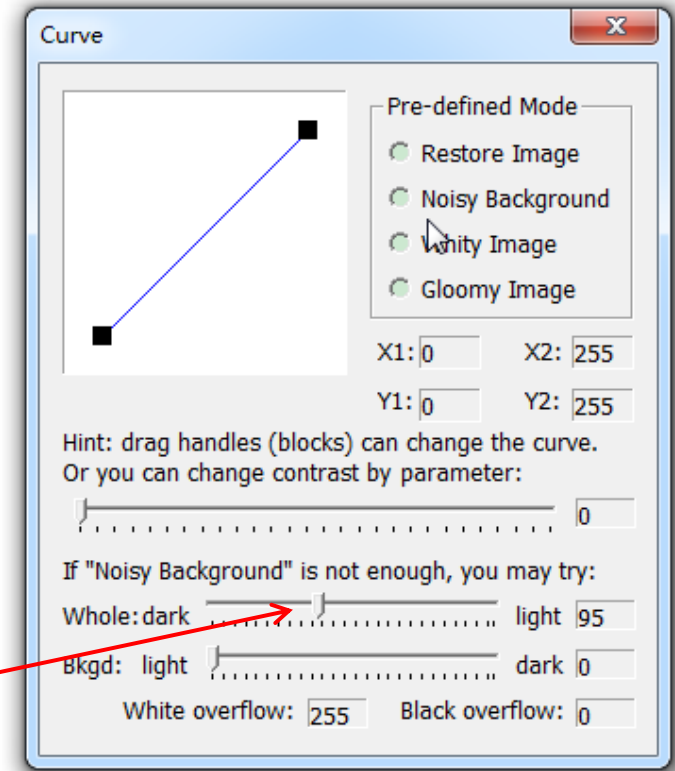
27. Since the lower part of the page is darker than the upper, select "Illum correction" to balance it.

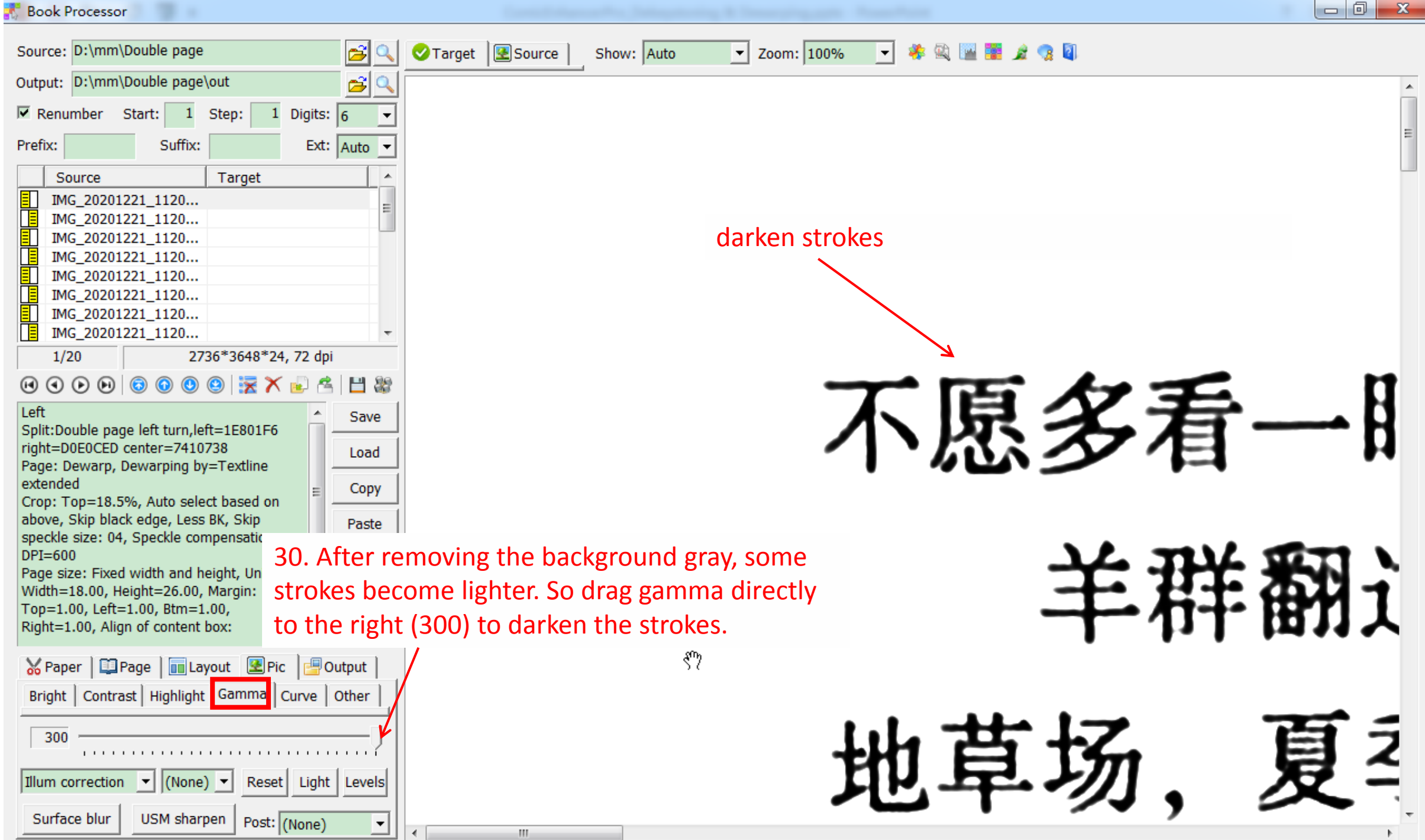


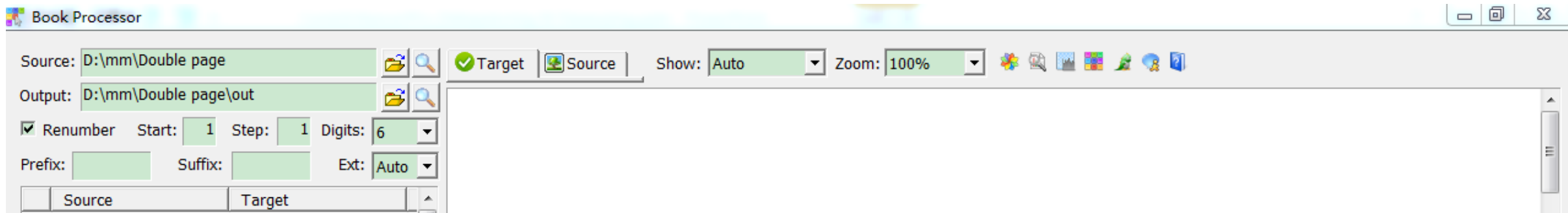
28. There is still a little yellow left after the light is balanced. Because the final goal is black and white, here I choose the simplest "channel mixing" to remove the background color: click the "Channel" button in the "Other" tab, and then select red, green, and blue in the "Mix channels" to see which color removal effect is better. Blue is selected here.



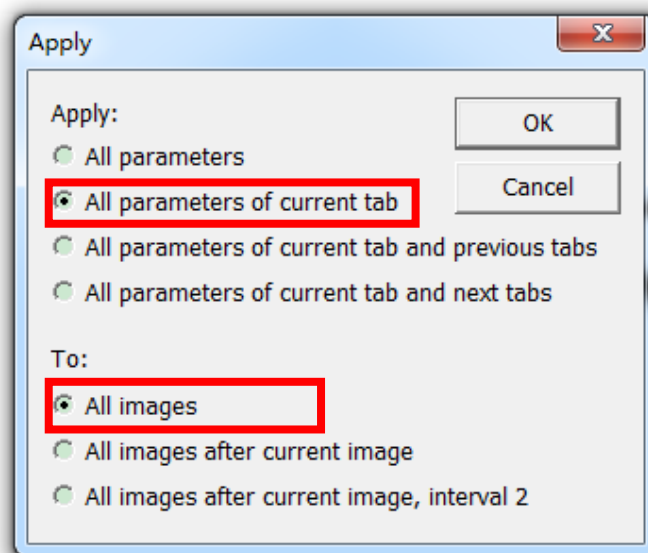
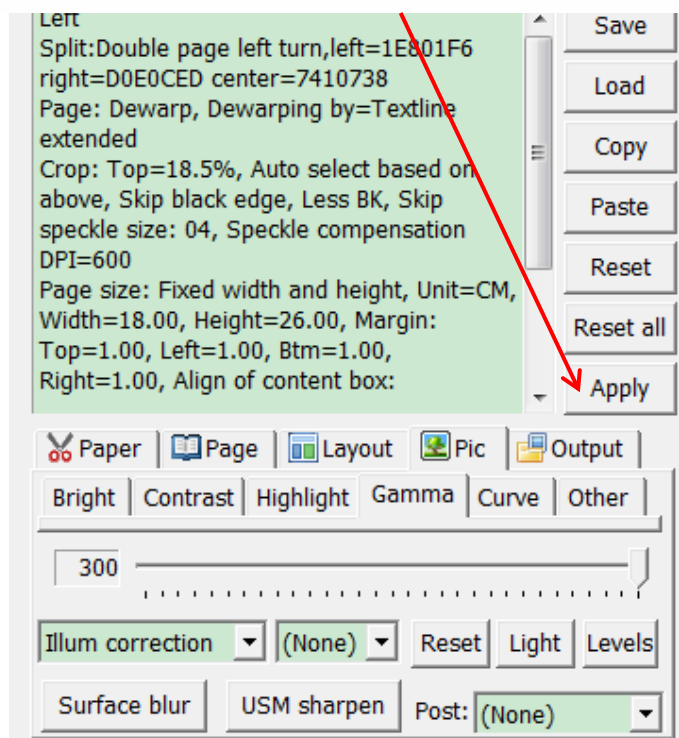
29. To remove the rest of the gray background, I used to try contrast or curve. First, I tried with contrast, and found that it took 170 to remove the gray at the bottom, but the upper stroke was too thin at this time. So it seems that the linear enhancement of contrast is not suitable for this picture. So restore the contrast to 100, and then click the "Adjust" button on the "curve" tab, and look at the image while clicking the "Whole" to the right. When the point reaches 95, the background color is removed.



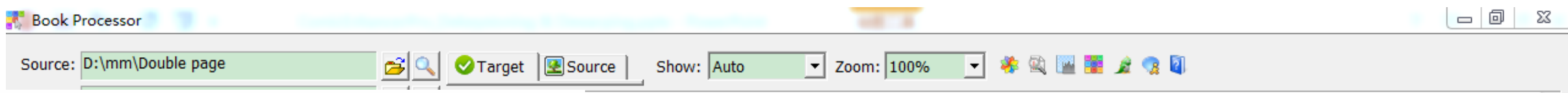




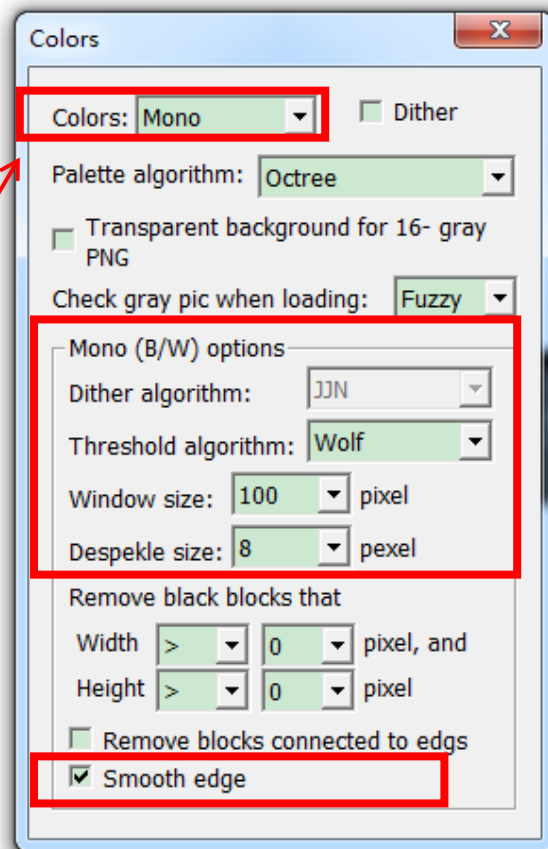
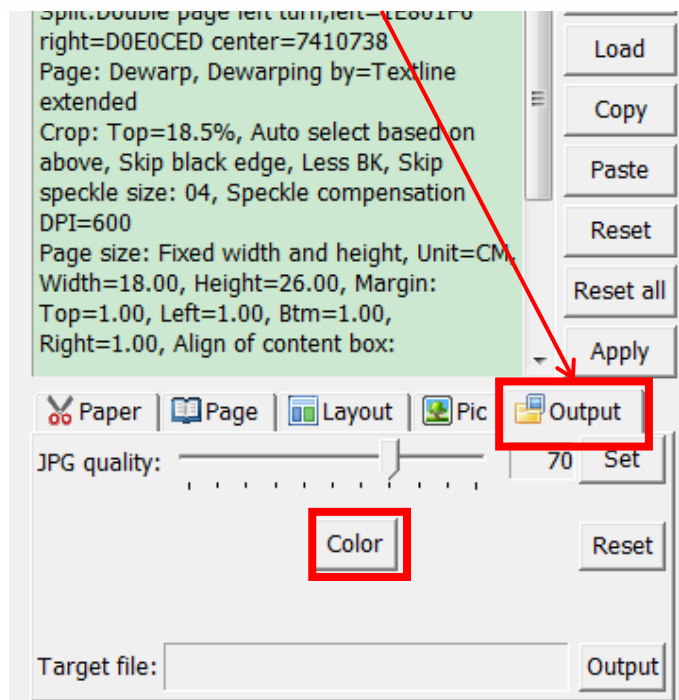
31. Click "Apply" button to apply "All parameters of current tab" to "all images". Then double-click the left or right side of the preview window to turn the page back and forth to see the effect of other pages. If find any problems, adjust parameters for that page.



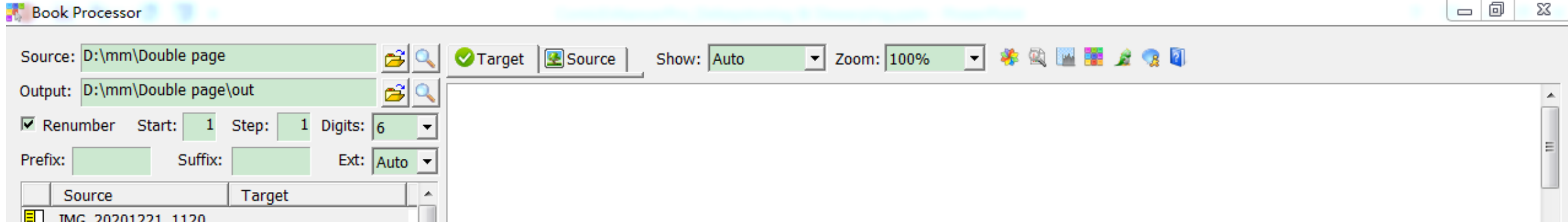
愿多看一目
羊群翻过
地草场，夏季



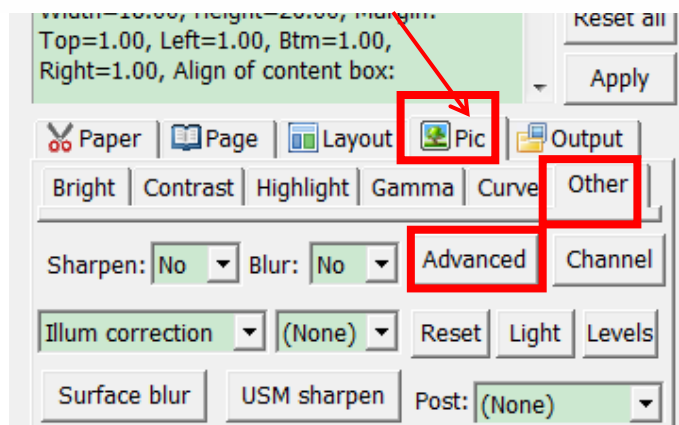
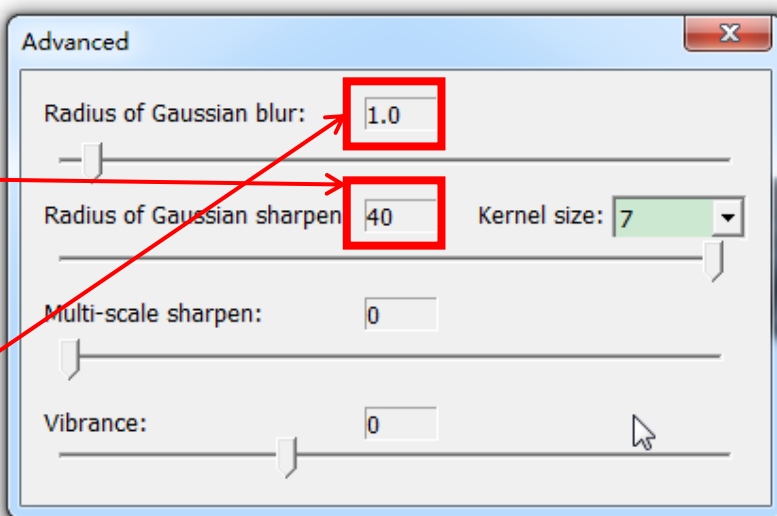
32. Click the "Output" tab, and then click the "color" button to set the "colors" to "Mono", and select "wolf" for the "threshold algorithm", so that it is convenient to use "window size" to control stroke thickness and stroke discontinuity (generally, the window size should not be less than two character width). In this picture, "window size" is selected as 100 according to the text size. The visual image is relatively clean, so select 8 for "despeckle size", and then check "smooth edge".



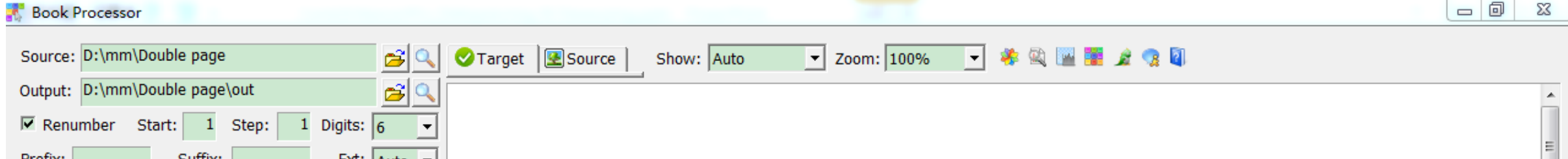
不愿多看一眼
羊群翻过
地草场，夏季



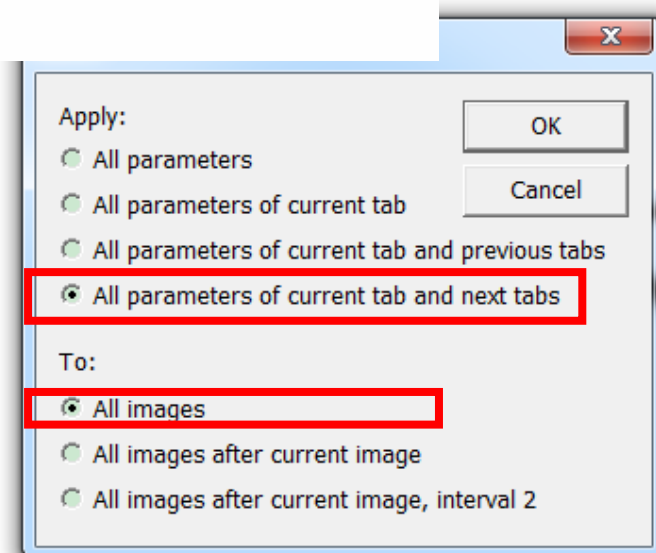
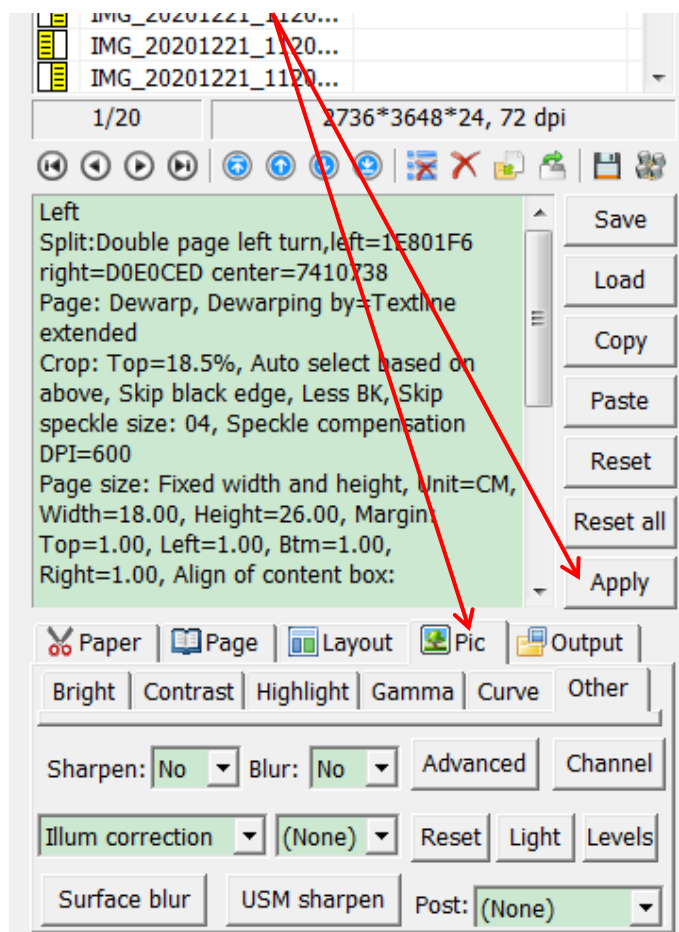
33. Look at the result image carefully, some strokes still have adhesion. The solution is "sharpening". So go back to the "Pic" tab, in the "other" page, click the "Advanced" button, pull the "Radius of Gaussian sharpen" to the right (40), and see that the strokes are less conglutinated, but the edges of some strokes are too stiff. So click the "Advanced" button again, and pull the "Radius of Gaussian blur" to 1.0, then the stroke edges will be smooth.



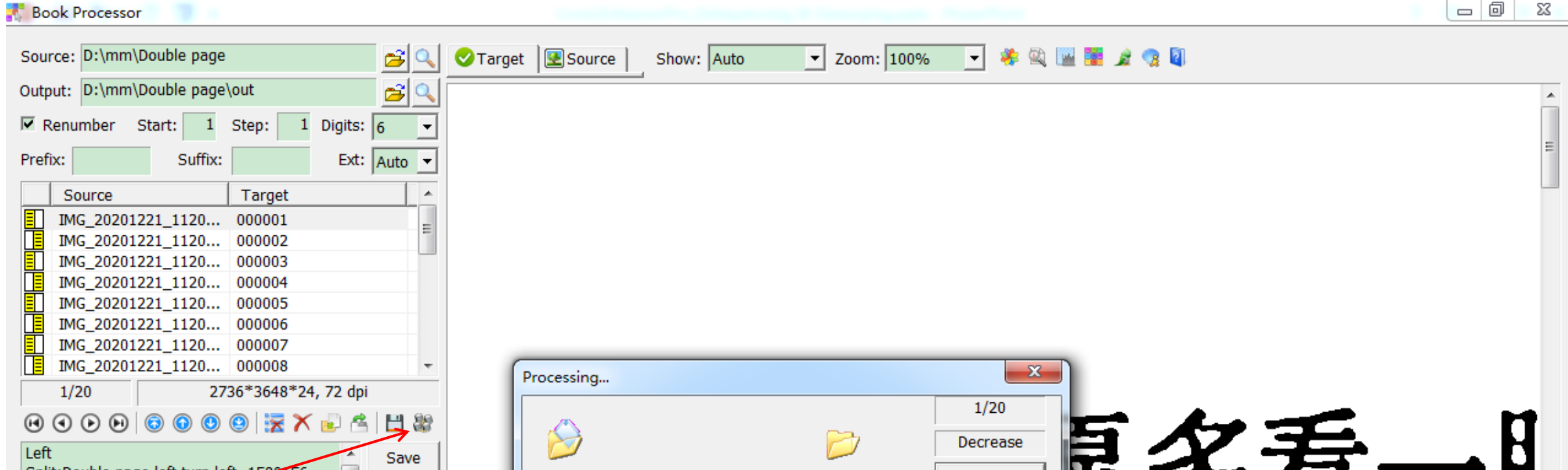
愿多看一眼
羊群翻过
地草场，夏季



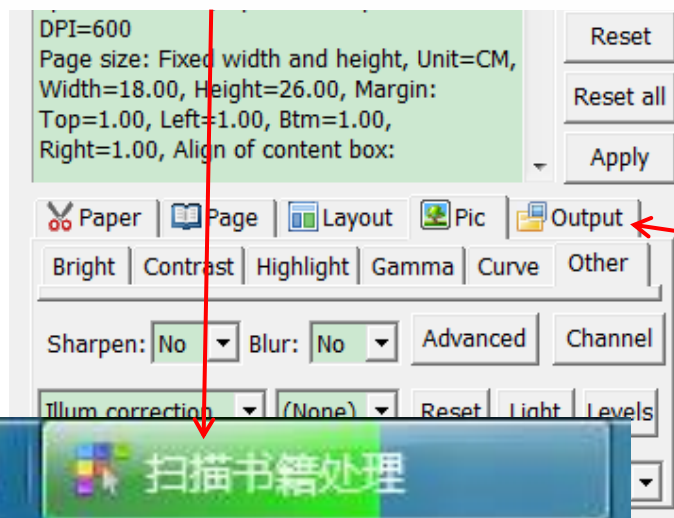
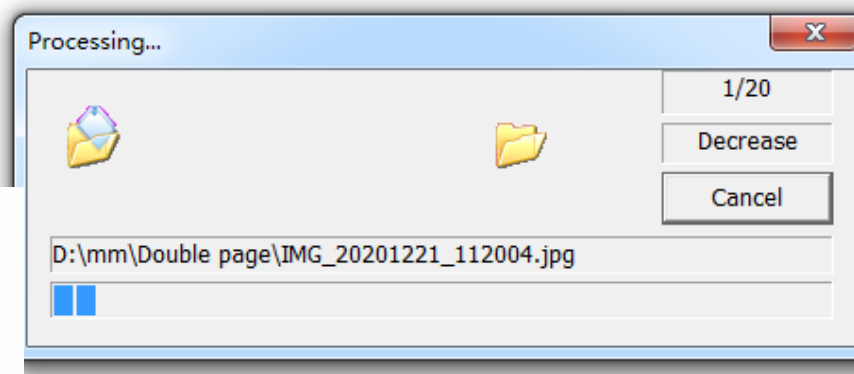
34. Keep it in the "Pic" tab, click the "Apply" button and select "all parameters of current tab and next tabs" to apply to "all images". In this way, it is unnecessary to set "Pic" and "Output" parameters page by page.



愿多看一眼
羊群翻过
地草场，夏季




35. Click the "batch process" button on the middle toolbar to start batch process until the progress bar on the taskbar is full.



36. Use an image browser (such as ComicsViewer) to quickly view the output images. If you feel that an image is not satisfactory, you can adjust the processing parameters of the image separately. After adjustment, click the "output" button in the "output" tab to output the page separately.





FreePic2Pdf

1. Select the image files to be converted:

File list:  ☒ Auto clear Auto sort: Alphabetically

Files


Then use FreePic2Pdf to convert output images to 2-layer PDF (image layer + hidden text layer).

Files in folder:     Filter: All supported Sort: Alphabetically

D:\mm\Double page\out

☐ Look in subfolders ☐ Include top folder Convert folders to: One folder to one PDF

2. Target

☒ All in one PDF:  ☐ Fixed file/folder

D:\mm\Double page\out.pdf

☐ Every image to a PDF and save them in the folder:

D:\mm\Double page\out

☒ OCR to make 2-layer PDF: Chinese Simplified CJK line: Horizontal Proof PDF

☒ Merge words to line Remove blocks bigger than 1/ 6 of page OCR progress:

3. Options

4. Go

View Log Impt/Expt

Options

Paper

Size: Image size

Orientation: Portrait

Width: cm

Height: cm

Margin

Top: 0.00 cm

Bottom: 0.00 cm

Left: 0.00 cm

Right: 0.00 cm

☐ Scale to fit media

Initial view

Layout: One column

Zoom: Fit width

☐ Open in full-screen

DPI

☐ Current screen DPI

☒ Fixed DPI: 300

☒ Image DPI

☒ Transparent B/W TIFF

☒ Transparent GIF/PNG

☒ Use interface file

Bookmark zoom: Fit page

Page prefix 1: Page prefix 2:

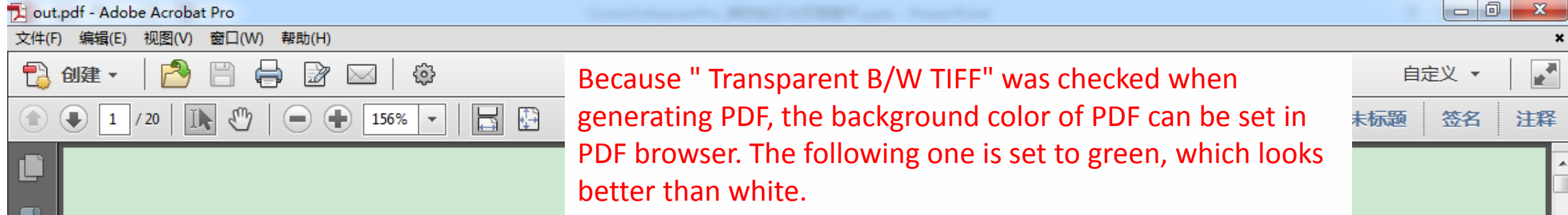
Empty prefix means use character and Roman numerals.

Compression for images except JPEG and JPEG 2000

B/W: CCITT G4 Color/gray: Max speed

JPEG quality: 75 JPEG 2000 compress rate: 10 %

OK Cancel



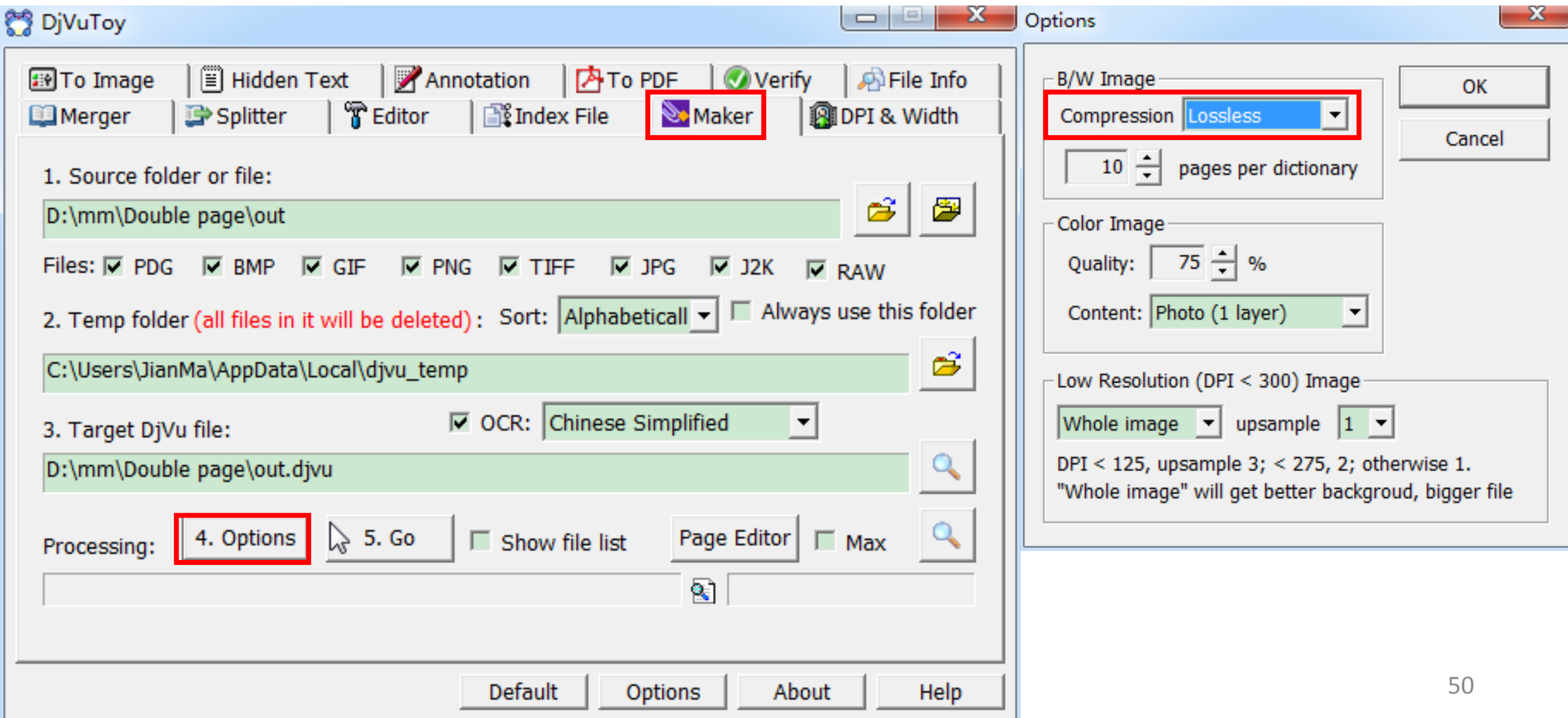
不愿多看一眼处女草原上新出现的千疮百孔，便赶着羊群匆匆向西北走去。

羊群翻过一道山梁，走出了盆地草场。毕利格老人要求各组畜群不要死啃盆地草场，夏季天长，必须尽量远牧，以便坚持到夏末秋初不搬家。他计划用畜群把这盆地内外大片草场来回蹉过几遍，控制草势疯长，踩实过松的新土壤，以防危险的蚊群。陈阵的羊群散成半月形的队伍，向西面山坡慢慢移动。

阳光下，近千只羊羔白亮得像大片盛开的白菊花，在绿草坡上分外夺目。羊羔的鬃毛已经开始蓬松，羊羔又吃奶又吃嫩草，它们的肥尾长得最快，有的快赶上母羊被喂奶耗瘦的尾巴了。满坡的野生黄花刚刚开放，陈阵坐在草地上，眼前一片金黄。成千上万棵半米多高的黄花花株，头顶一朵硕大的喇叭形黄花，枝杈上斜插着沉甸甸的笔形花蕾，含苞欲放。陈阵坐在野生的黄花菜花丛里，如同坐在江南的油菜花田里。他没想到处女草场的野生黄花，要比人工种植的花大得多，最大的花蕾竟然差不多像是一支圆珠笔了。

陈阵站起来骑上马，跑到羊群前面花丛更密的地方，蹉花采蕾。这些日子鲜嫩可口的黄花菜，已经成为北京学生的时令菜，黄花菜炒羊肉，黄花菜炖包子，

If you want, you also can convert output images to DjVu by DjvyToy. But you'd better select "Lossless" for "B/W image compression".



Notes

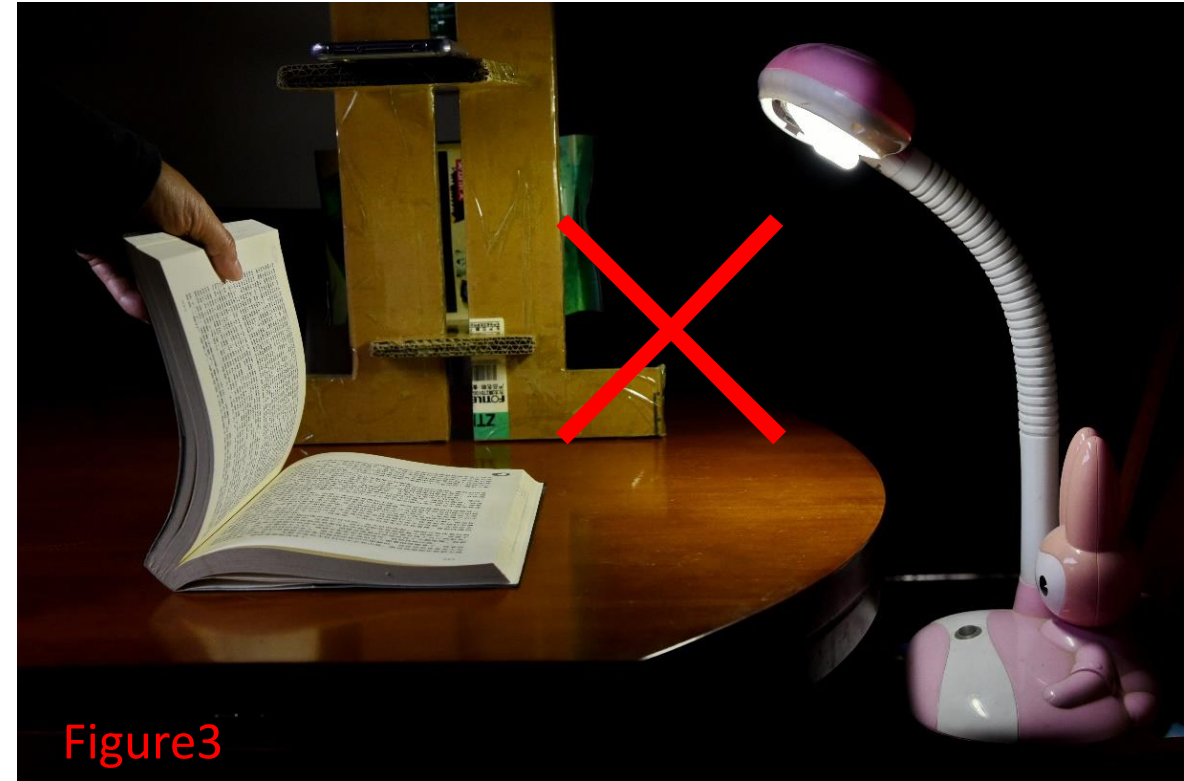
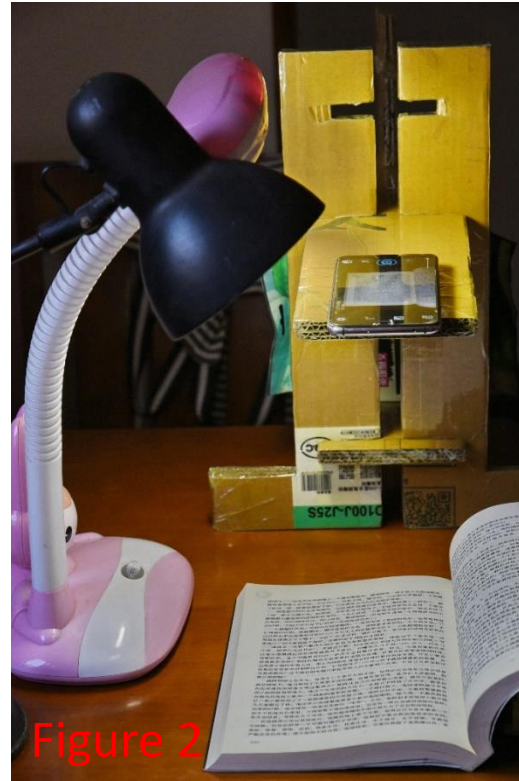
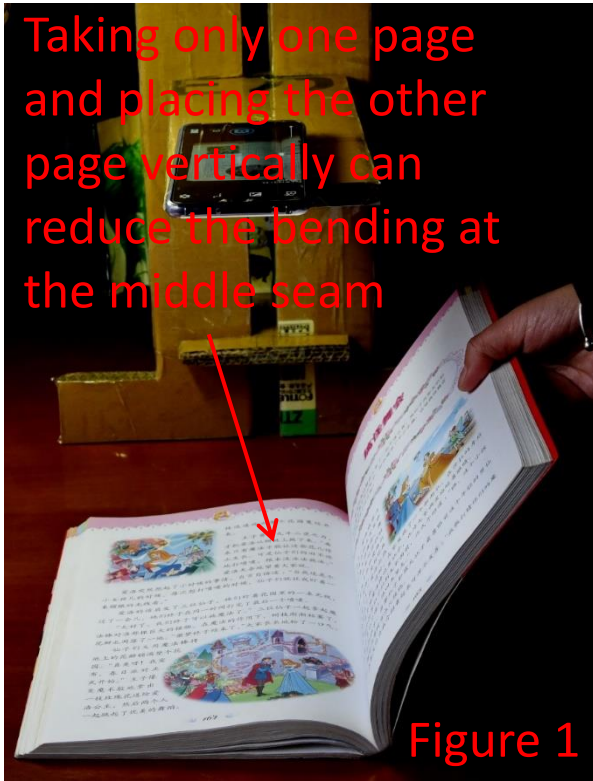
- Here after setting the parameters of each tab, it was suggested to click the “Apply” button to copy the tab parameters to all pages. And after setting and applying the dewarping parameter, it was suggested to do batch process and to create dewarping model for each page. In these ways, in the subsequent processing, the time of dewarping modeling is saved when flipping back and forth.
- If you want to do it quickly, you can also adopt a process that is not so safe: process the first page from beginning to end, then click the “Apply” button, select to apply "all parameters" of the current page to "all images", and click the “Batch process” button to process. Then use image browser to quickly view the results, and adjust the page that you are not satisfied.
- If there are many repetitions in the process of above, you can first take several pages from the front, middle and back of the book to be processed and mix them together to get a set of parameters that are applicable to the whole book. Then click the "copy" or "save" button, open the whole book, click the "paste" or “load” button, and then click the "apply" button to apply to the whole book. Then process in batch.
- As long as the source folder and the output folder are not same, there will be no file overlay. That is, no matter how to deal with it, the original file will remain unchanged. So if you think your skill has improved, you can process source images again by reopen the source folder.

D. Dewarping (single page)

- This chapter takes "Page Edge" as an example to show how to dewarp curved pages.
- Before dewarping, you need to split pages first (find the left and right vertical lines). So the left and right boundaries and the middle seam of pages are required to be clear and complete in picture.
- Dewarping with "Page Edge" doesn't care about the content of page, just require page edges are complete and clear, and have enough contrast with the background.
- Any model-based auto flattening method can't guarantee complete flattening. So even with the auto dewarping function, you'd better flatten the page and then shoot it.
- The content repeated with the previous chapter will be omitted in this chapter.

Shooting process of single page sample

- The same DIY scanner used in the previous chapter, which is made of cardboard.
- In order to solve the problem of text extrusion deformation at the middle seam, only one page is taken at a time, and the other page stands up (see Fig 1) .
- Two lights are used to illuminate the upper and lower parts of the page on the same side (Fig 2), and close to the center, so that the light is uniform and finger shadow is eliminated. Do not use low angle oblique lighting (Fig 3).
- Single page shooting usually takes the left or right half of the book first, and then reverses the book and takes the other half of the page. So after shooting, we should put the left half and right half of the photos in different folders and process them separately, or renumber them first and then put them in the same folder for processing.



Exposure locking and focus locking in single page shooting

1. Exposure locking means that the camera locks the exposure parameters (aperture, shutter, ISO) after automatic photometry, and then all photos are taken with the same parameters. Without exposure locking, the automatic light measurement will be carried out for every photo taken, and may be affected by the content of the page (such as the color of illustrations and the number of text in the page).
2. Focus locking means all photos are taken according to a fixed focus distance. Without focus locking, the auto focus system will automatically select the focus in the camera's field of view every time you take a shot. It is possible to select the place you don't want, resulting in waste picture. This problem is not prominent in two page shooting, but if you use the single page shooting shown in the Figure 1, it is quite a problem.

So, the benefits of exposure locking and focus locking are:

1. Save the time of auto focus and auto photometry before each shooting.
2. Exposure locking can ensure the consistent exposure of all photos, and a set of image processing parameters is applicable to all (at least most) pages.
3. Focus locking can prevent auto focus mistake, which resulting in blurred photos.

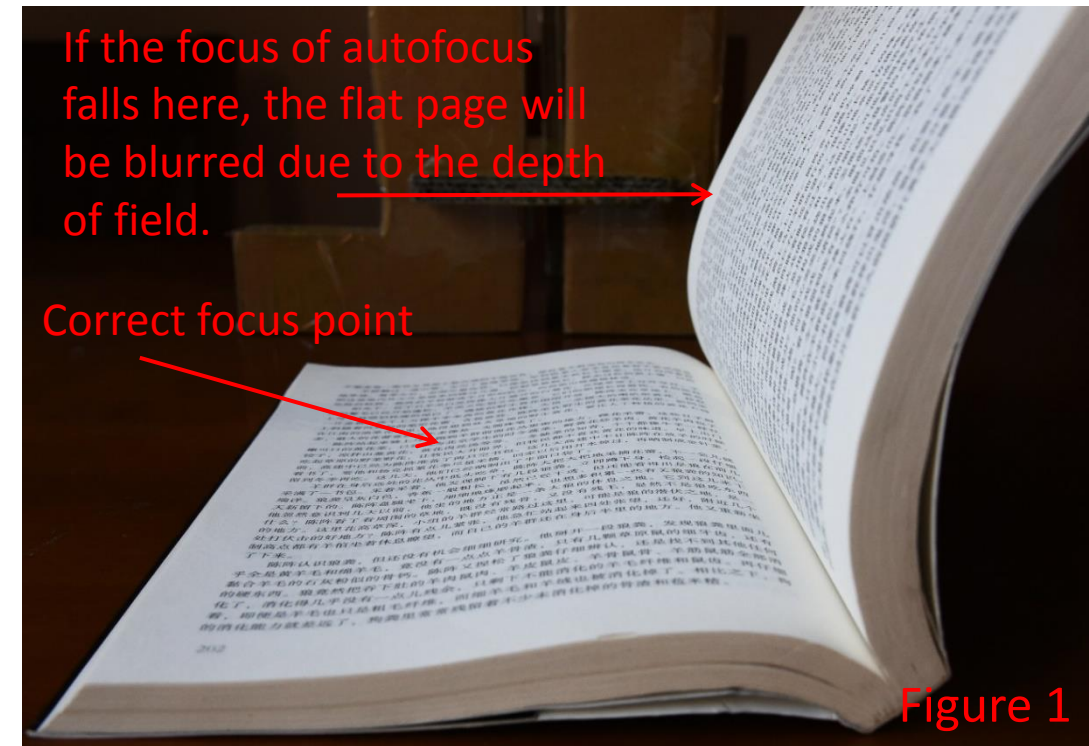


Figure 1

Exposure locking and focus locking with Open Camera

Before shooting, open the book to the middle half of the thickness, and adjust the position so that the page is in the middle of the photo. Then touch the middle position of the page on the screen. When the auto focus green box appears (Fig 1), click the exposure lock (Fig 2) and focus lock (Fig 3) of Open Camera.

Exposure locking and focus locking can be set separately. If the light on the scene is not uniform, you can touch the dark place to lock the exposure, and then touch the central position to lock the focus.

Touch the center of the picture with your finger, and the green box will appear if the automatic light measurement and auto focus are successful

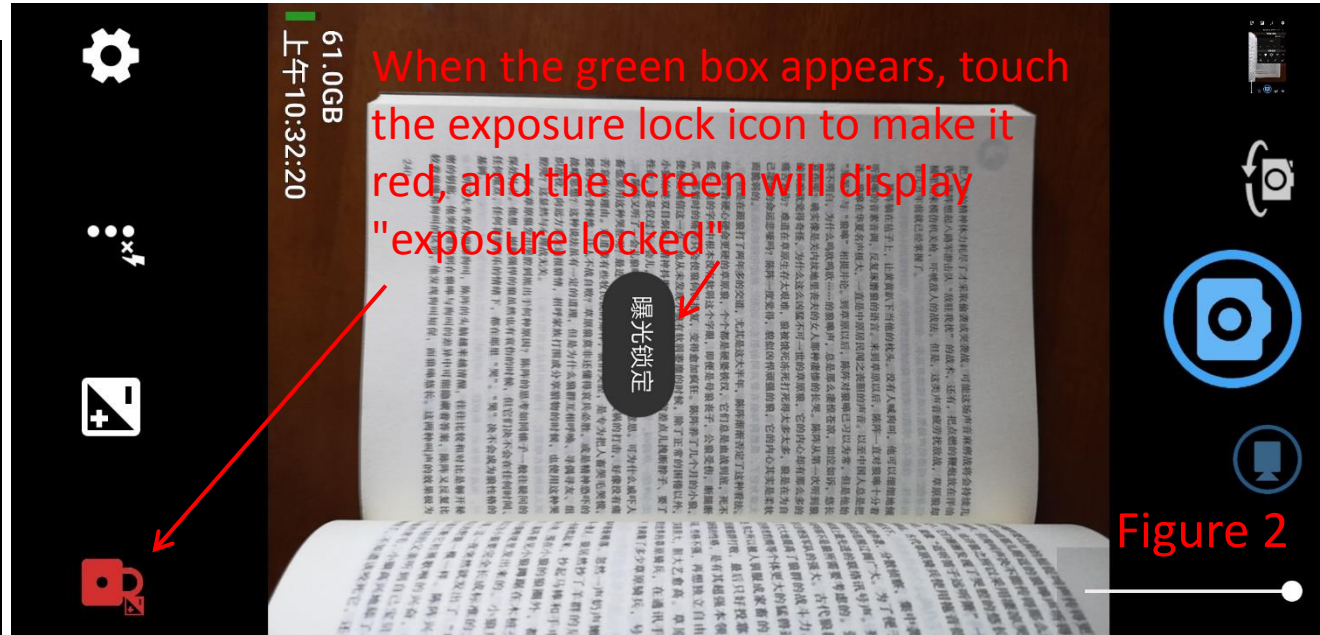
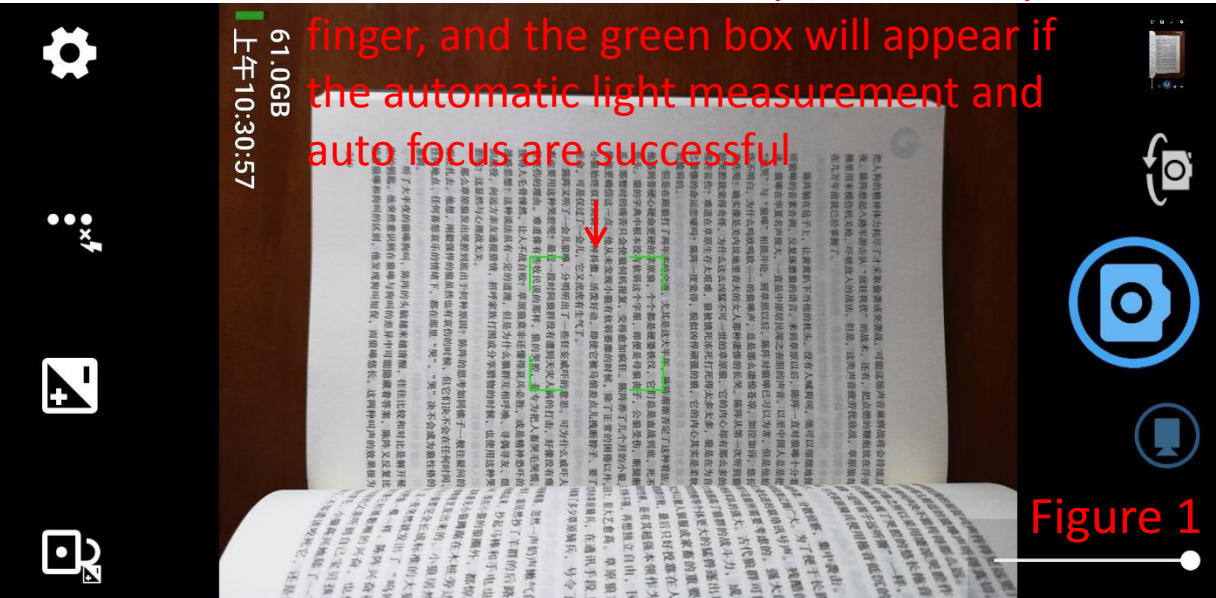


Image Processing Tips

Compared with the pure text or half-tone pages mentioned in the previous chapter, the color illustrated page processing has the following features:

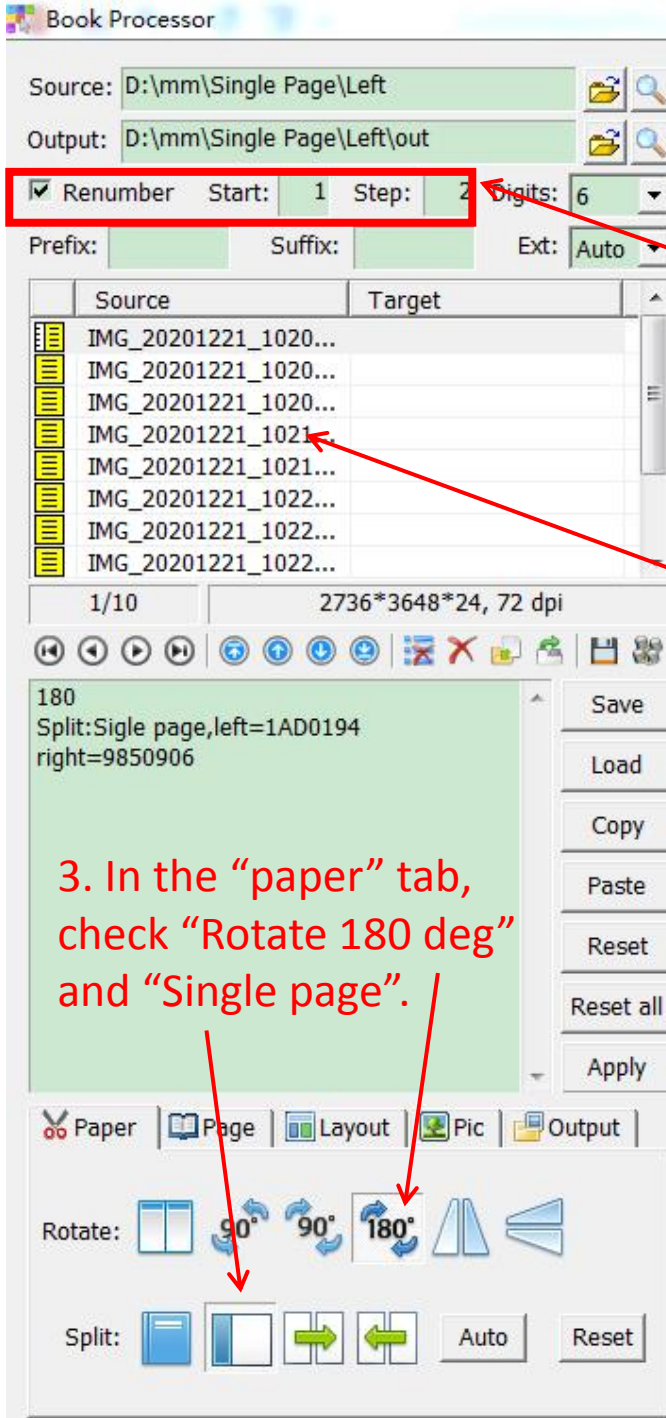
1. The final result is processed into color or gray image. But it requires that the background is clean, the text is black and white, and the color is accurate.
2. In general, 300 dpi is enough. In the subsequent reading process, even if there is magnification, the quality of color or gray image is usually not too bad.
3. It is recommended to store the result image with rich color as JPG file. It is not recommended to reduce JPG quality unilaterally in order to reduce the file length. Now the storage price is decreasing year by year, but lost image quality will never come back.
4. If the number of colors in the result image is not much (no more than 16 colors), it is recommended to save it as a lossless compressed PNG file.
5. The OCR quality of illustrated books will not be very good.

Prepare for example

1. Download ComicEnhancerPro_D&D_Examples.zip from my net disk.
2. Unzip it and you'll see "Single page" folder that the example images of this chapter in.
3. You can first look at "out.pdf", compare it with the original photo.
4. Double click "CEP_Processor" icon on the desktop to start CEP, and enter the book processor interface.

Double click this icon on the computer desktop to start CEP, and enter the book processor interface.

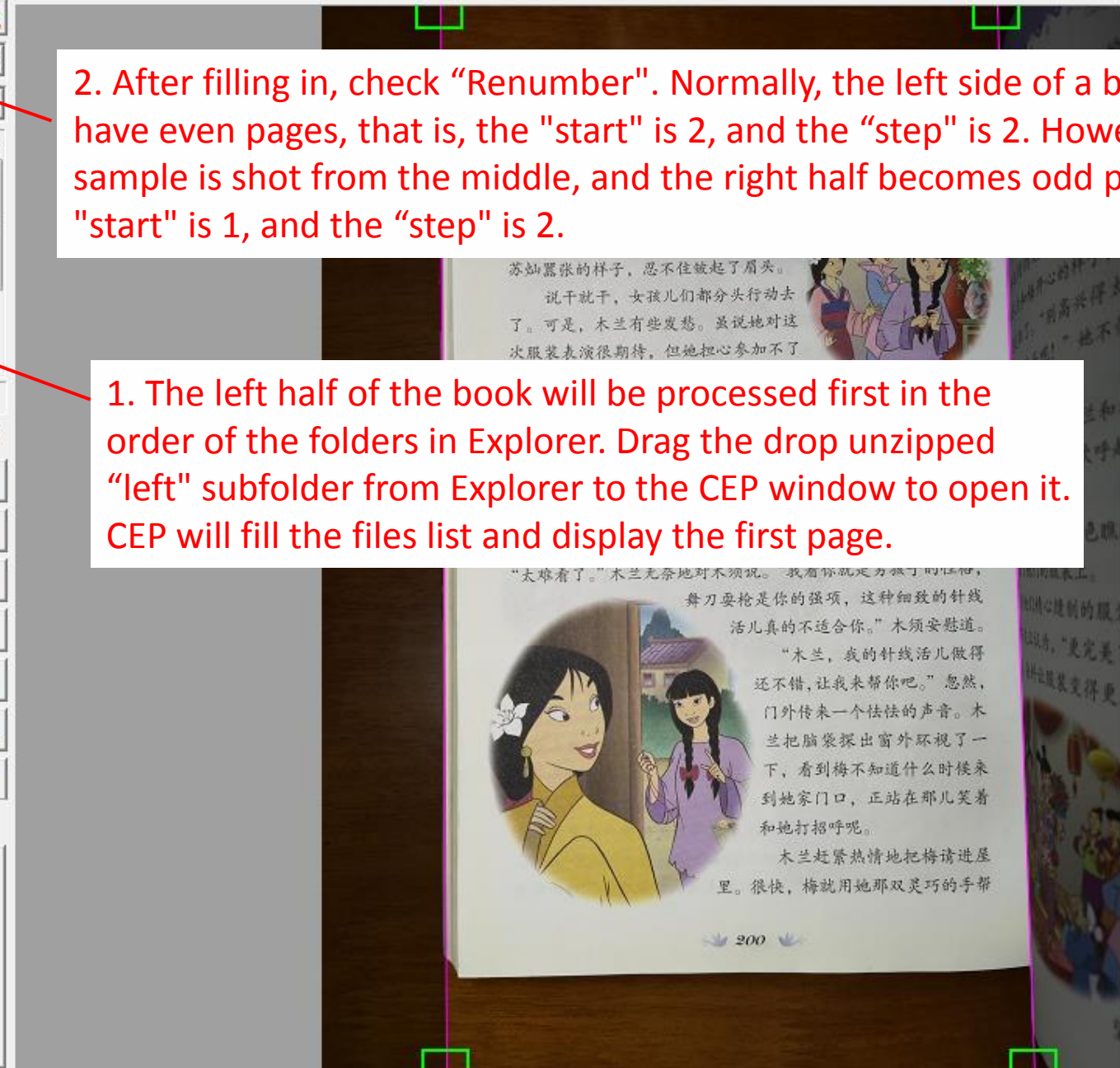


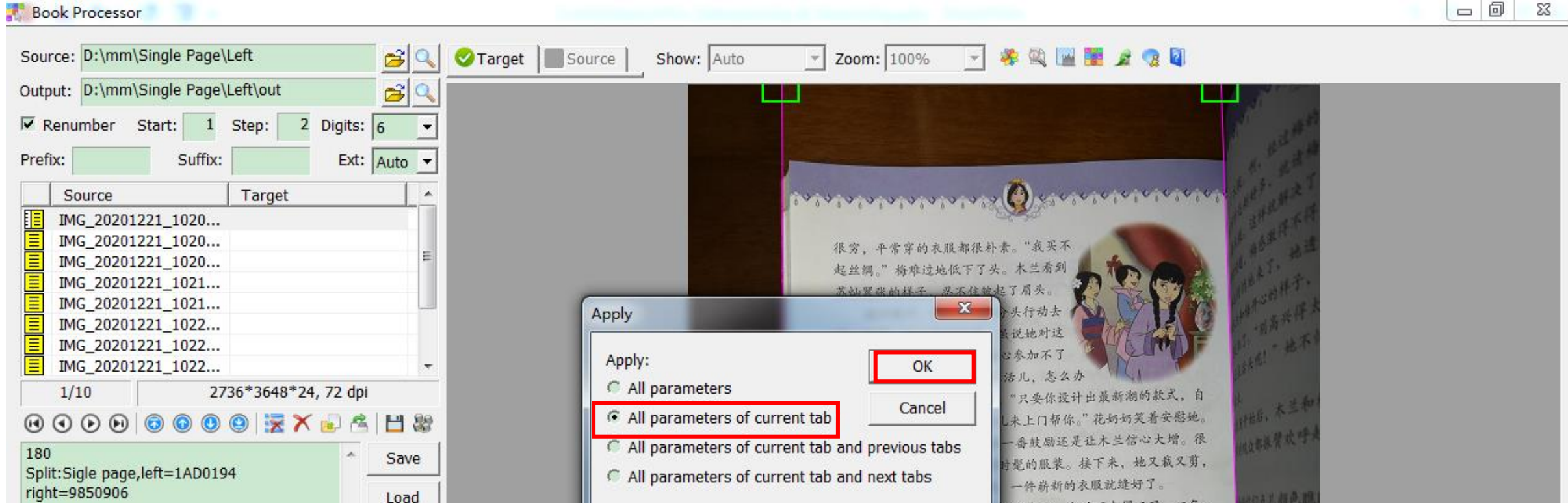


2. After filling in, check "Renumber". Normally, the left side of a book should have even pages, that is, the "start" is 2, and the "step" is 2. However, this sample is shot from the middle, and the right half becomes odd pages, so the "start" is 1, and the "step" is 2.

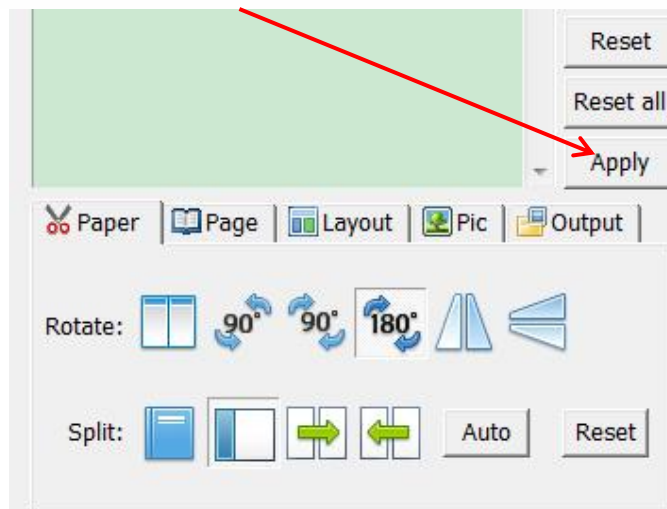
1. The left half of the book will be processed first in the order of the folders in Explorer. Drag the drop unzipped "left" subfolder from Explorer to the CEP window to open it. CEP will fill the files list and display the first page.

3. In the "paper" tab, check "Rotate 180 deg" and "Single page".

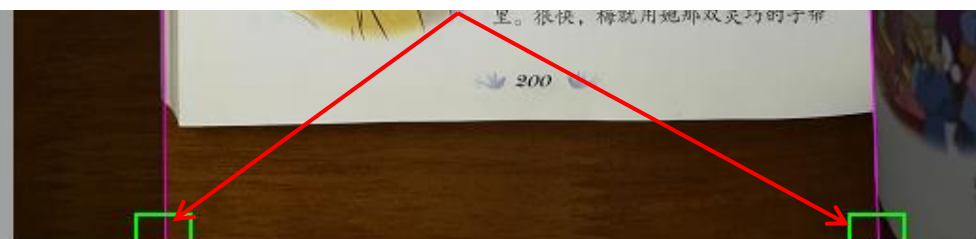


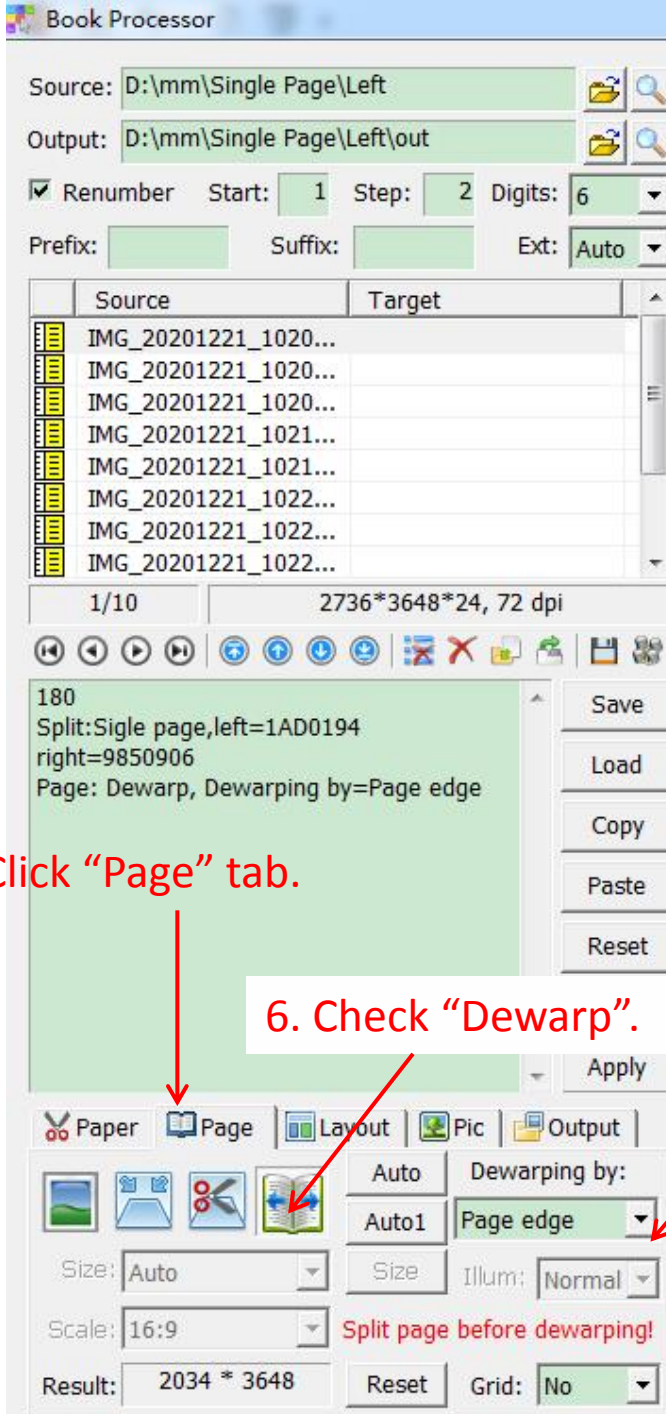


4. Click the "Apply" button to apply the parameter settings to all pages.



After "apply", double-click the preview window to turn the page to see if the left and right boundaries and the position of the middle seam are correct. If not satisfied, you can manually drag four green boxes to adjust the boundary line.

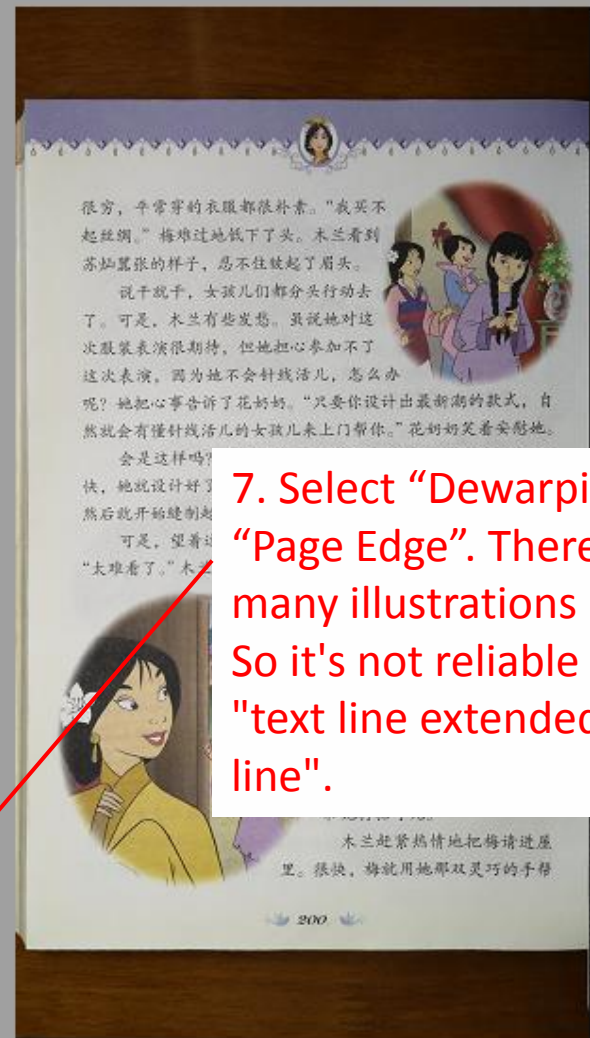




5. Click "Page" tab.

6. Check "Dewarp".

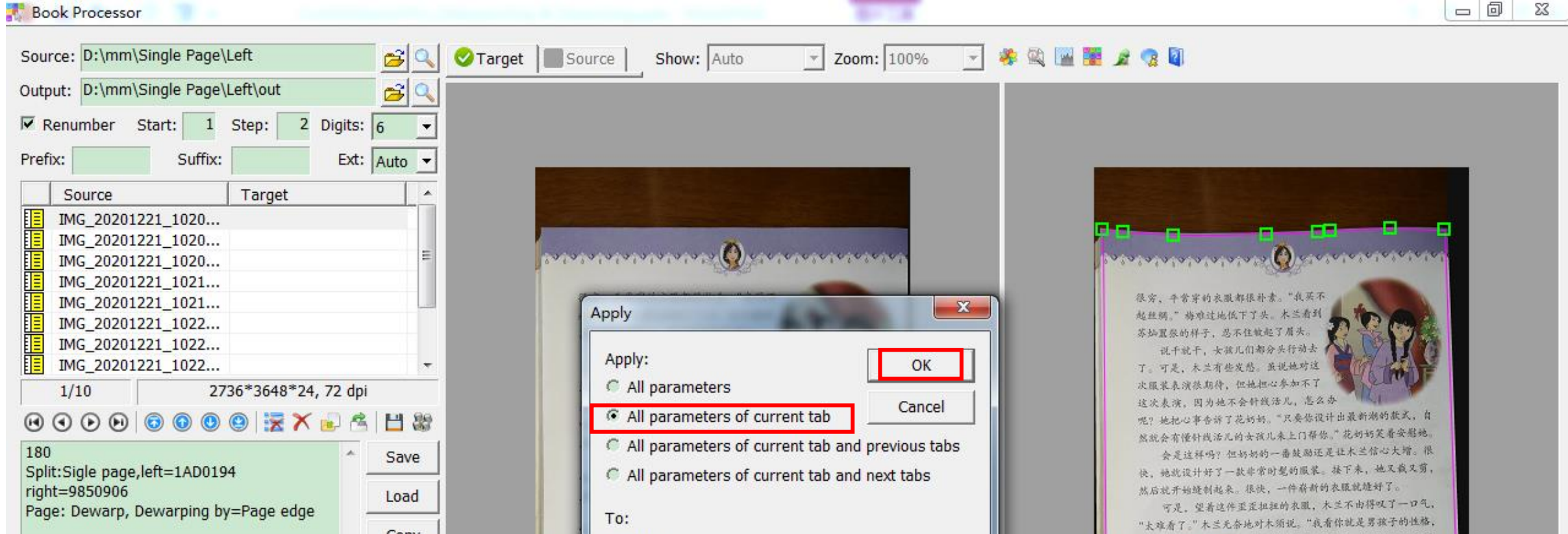
Here is the dewarped result.



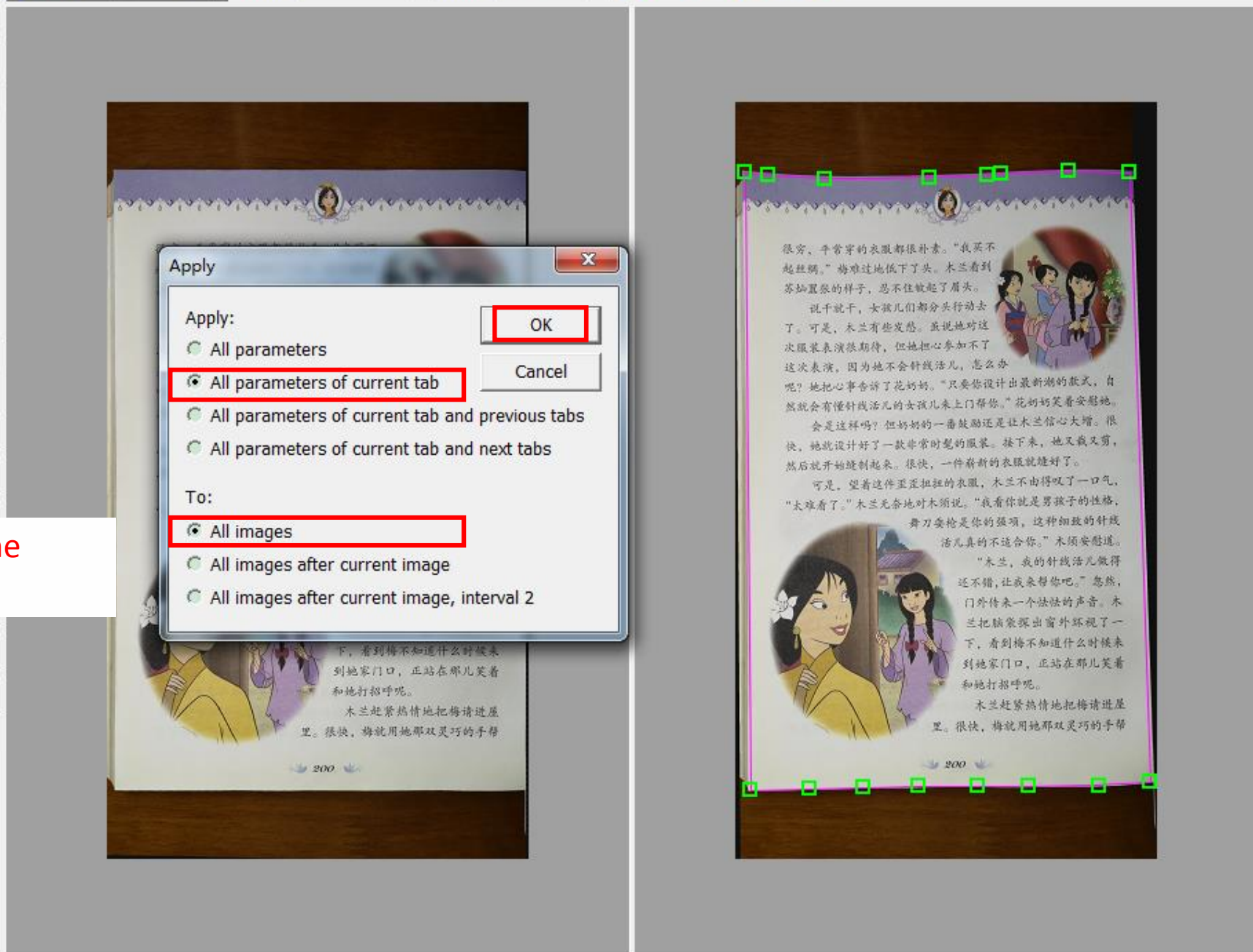
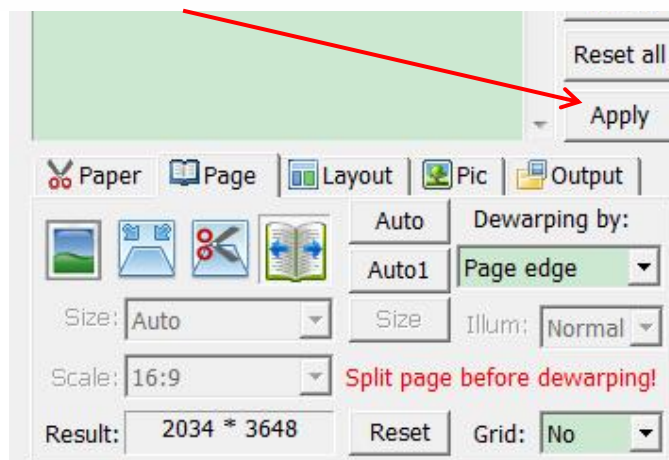
7. Select "Dewarping by" as "Page Edge". There are too many illustrations in this book. So it's not reliable to choose "text line extended" or "text line".

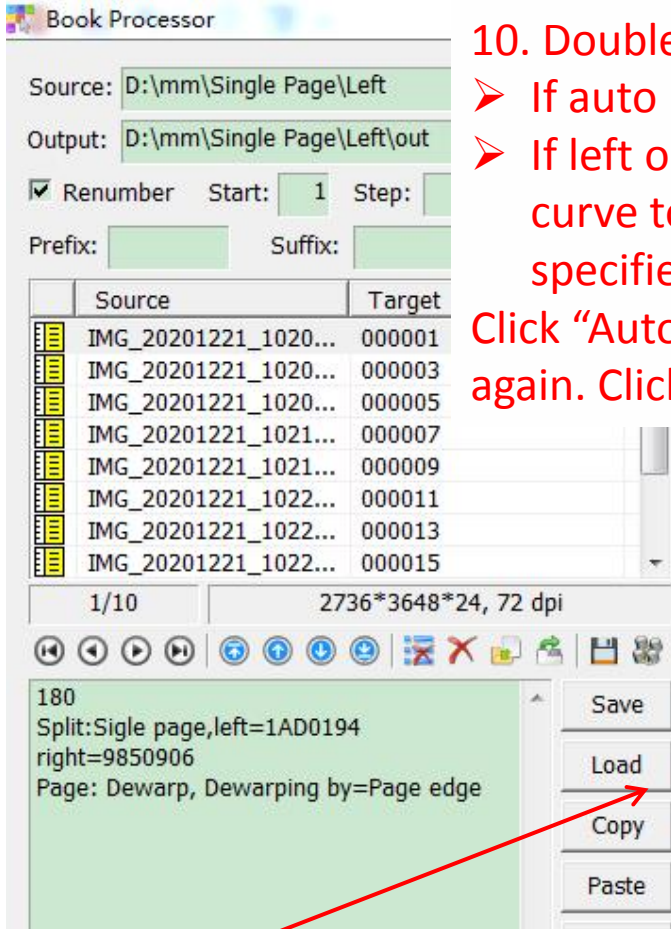
Pink borders are automatic dewarping models. Green boxes are draggable control points.



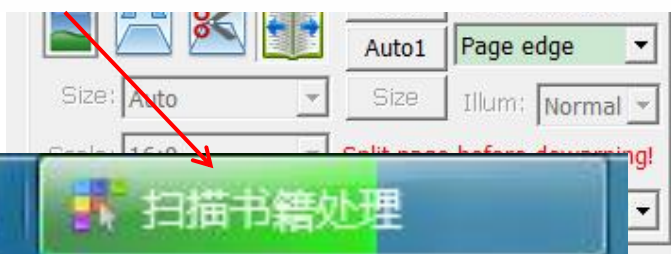


8. Click the "Apply" button to apply the parameter settings to all pages



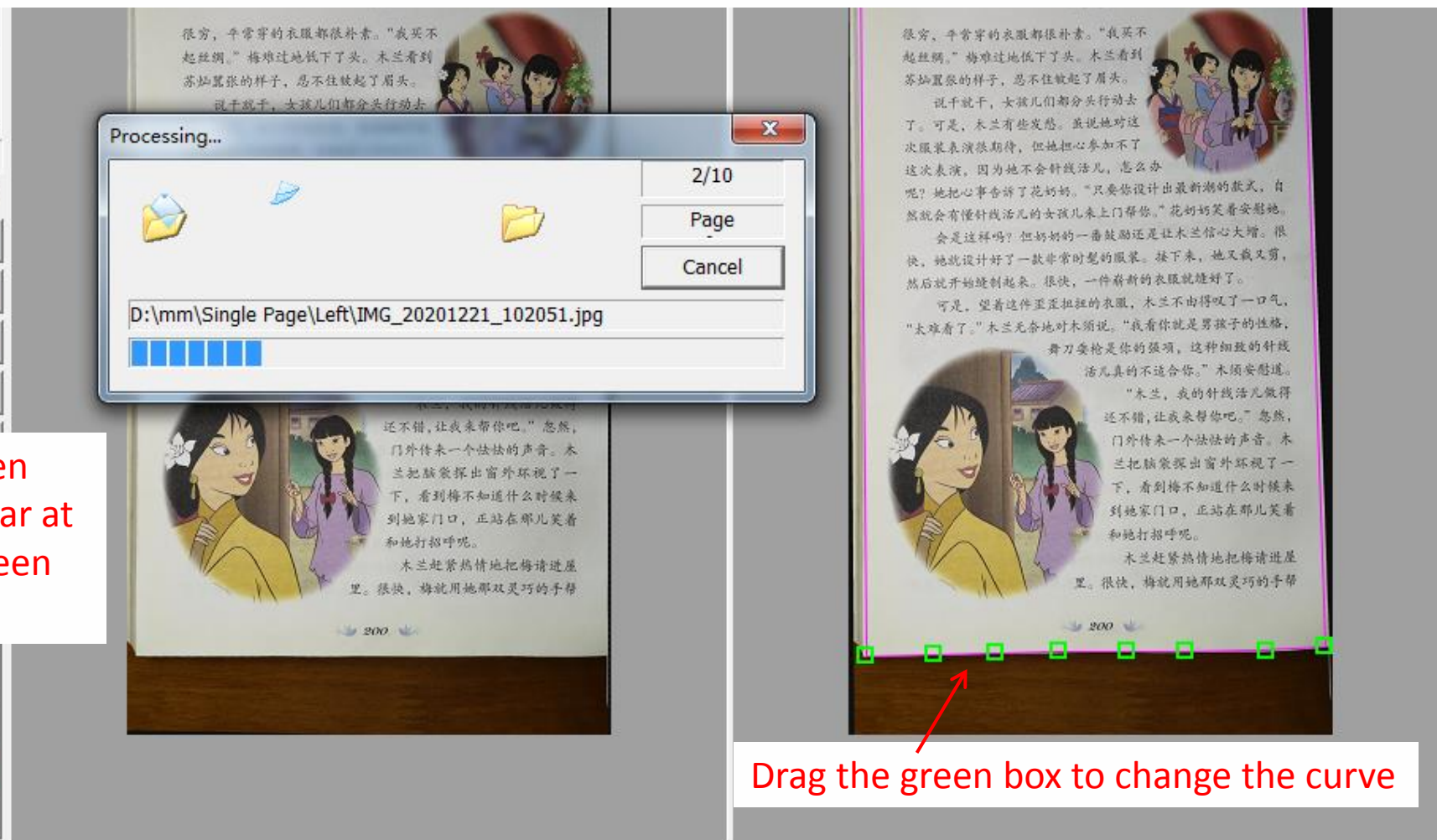


9. Click "Batch Process" button, and then patiently wait for CEP task on the taskbar at the bottom of the desktop to fill the green progress bar.



10. Double click the preview window to turn page forward to see the dewarping result of all pages:
 - If auto modeling is wrong, drag the green box on the pink frame to adjust the curve.
 - If left or right boundary line is not in the perfect position, drag the green box at the end of the curve to adjust the line, and then click "Auto 1" button to find the curve again within the specified left and right range.

Click "Auto" button at any time, you'll discard the manual adjustment and dewarp it automatically again. Click "Reset" button at bottom to cancel the all setting in this tab.

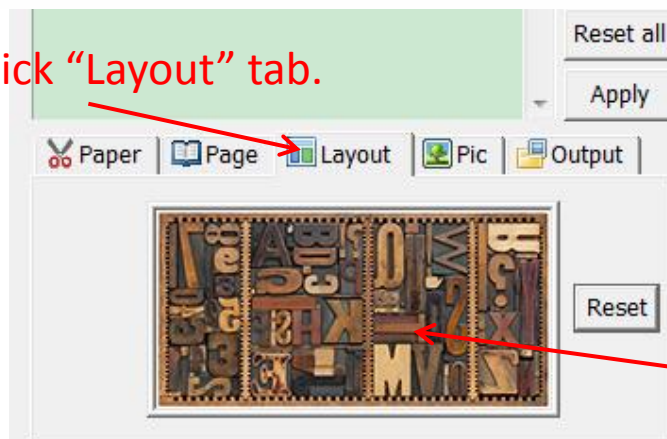


Drag the green box to change the curve



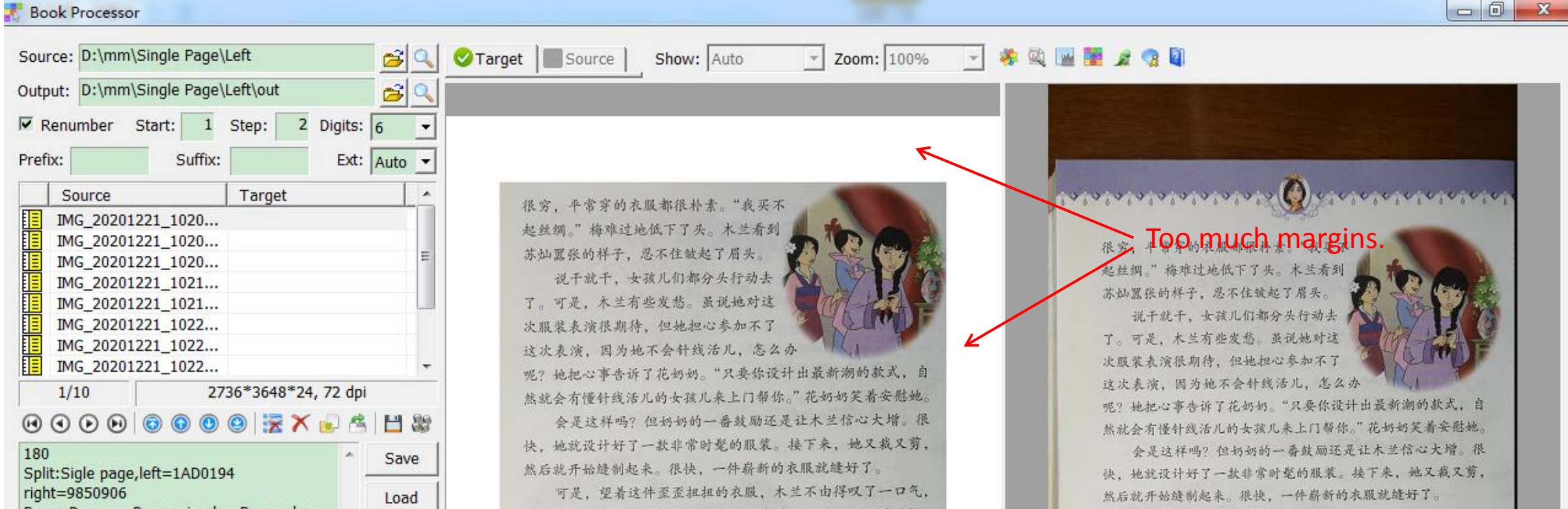
11. Click the "First file" button on toolbar to return to the first page in the file list.

12. Click "Layout" tab.

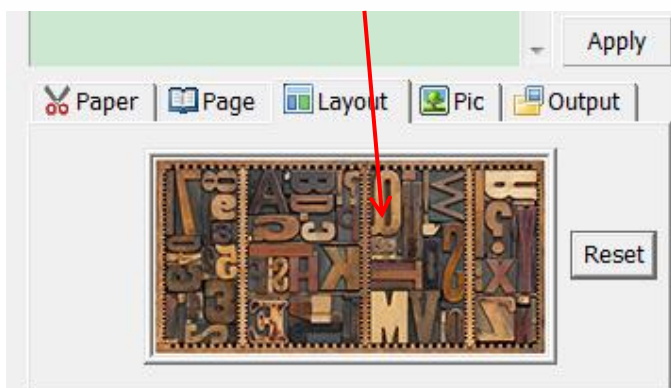


13. Click the big icon to open "crop" dialog box.

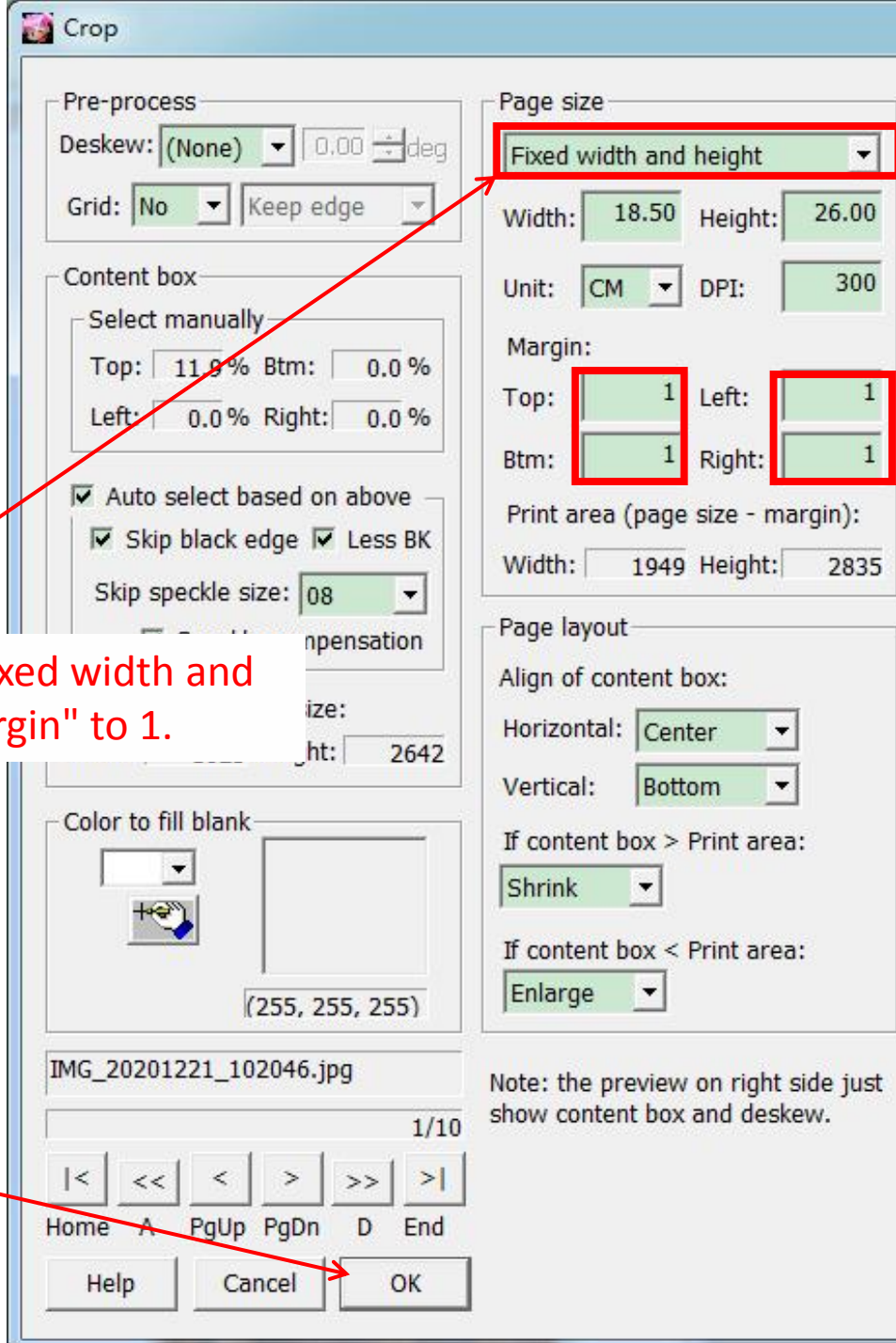




19. Look at the effect after clicking OK and find that there are too much margins. Click the big icon again to open the "Crop" dialog box to modify the parameters.



20. Change "page size" to "Fixed width and height", then change all "margin" to 1.



21. Click "OK" to exit.



Source: D:\mm\Single Page\Left

Output: D:\mm\Single Page\Left\out

☒ Renumber Start: 1 Step: 2 Digits: 6

Prefix: Suffix: Ext: Auto

Source	Target
IMG_20201221_1020...	
IMG_20201221_1020...	
IMG_20201221_1020...	
IMG_20201221_1021...	
IMG_20201221_1021...	
IMG_20201221_1022...	
IMG_20201221_1022...	
IMG_20201221_1022...	

1/10

2736*3648*24, 72 dpi



180

Split: Single page, left=1A0194
right=9850906

Page: Dewarp, Dewarping by=Page edge
Crop: Top=11.9%, Auto select based on
above, Skip black edge, Less BK, Skip
speckle size: 08, Speckle compensation
Page size: Fixed width and height, Unit=CM,
Width=18.50, Height=26.00, Margin:
Top=1.00, Left=1.00, Bottom=1.00,
Right=1.00, Align of content box:
Vertical=Bottom, If content box > Print
area=Shrink

Save

Load

Copy

Paste

Reset

Reset all

Apply

Paper Page Layout Pic Output



Reset



Target



Source

Show: Auto

Zoom: 100%



很穷，平常穿的衣服都很朴素。“我买不起丝绸。”梅难过地低下了头。木兰看到苏灿嚣张的样子，忍不住皱起了眉头。

说干就干，女孩儿们都分头行动去了。可是，木兰有些发愁。虽说她对这次服装表演很期待，但她担心参加不了这次表演，因为她不会针线活儿，怎么办呢？她把心事告诉了花奶奶。“只要你设计出最新潮的款式，自然就会有懂针线活儿的女孩儿来上门帮你。”花奶奶笑着安慰她。

会是这样吗？但奶奶的一番鼓励还是让木兰信心大增。很快，她就设计好了一款非常时髦的服装。接下来，她又裁又剪，然后就开始缝制起来。很快，一件崭新的衣服就缝好了。

可是，望着这件歪歪扭扭的衣服，木兰不由得叹了一口气，“太难看了。”木兰无奈地对木须说。“我看你就是男孩子的性格，剪刀耍枪是你的强项，这种细致的针线活儿真的不适合你。”木须安慰道。

“木兰，我的针线活儿做得还不错，让我来帮你吧。”忽然，门外传来一个怯怯的声音。木兰把脑袋探出窗外环视了一下，看到梅不知道什么时候来到她家门口，正站在那儿笑着和她打招呼呢。



木兰赶紧热情地把梅请进屋里。很快，梅就用地那双灵巧的手帮

200



Margins are better now.

很穷，平常穿的衣服都很朴素。“我买不起丝绸。”梅难过地低下了头。木兰看到苏灿嚣张的样子，忍不住皱起了眉头。

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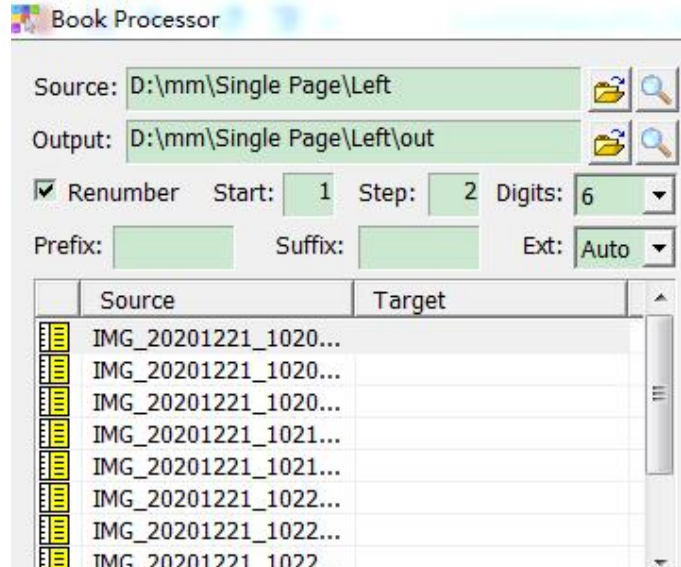
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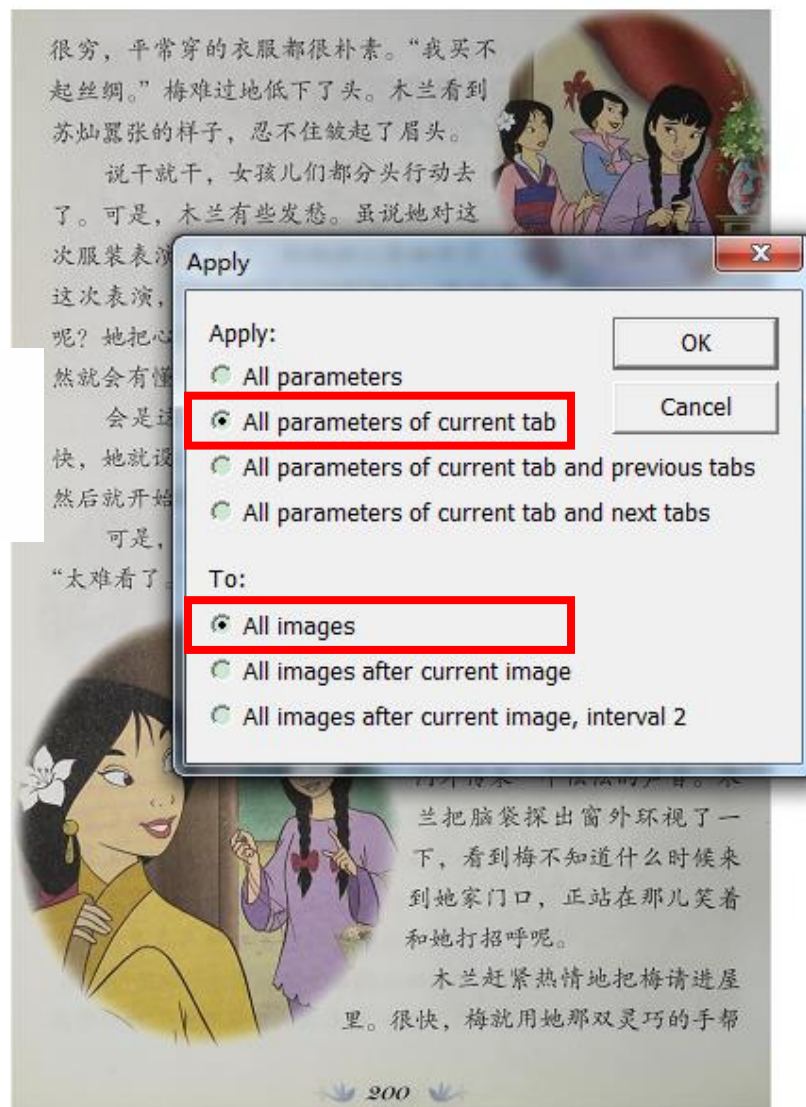
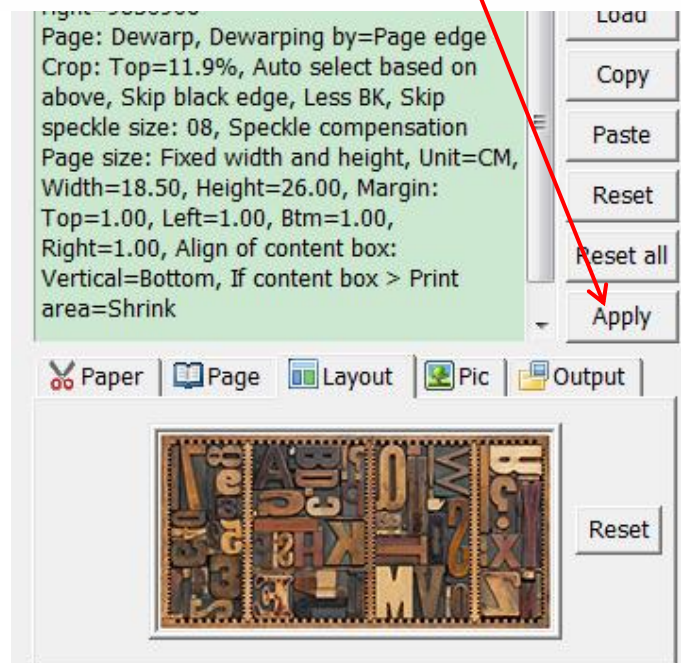


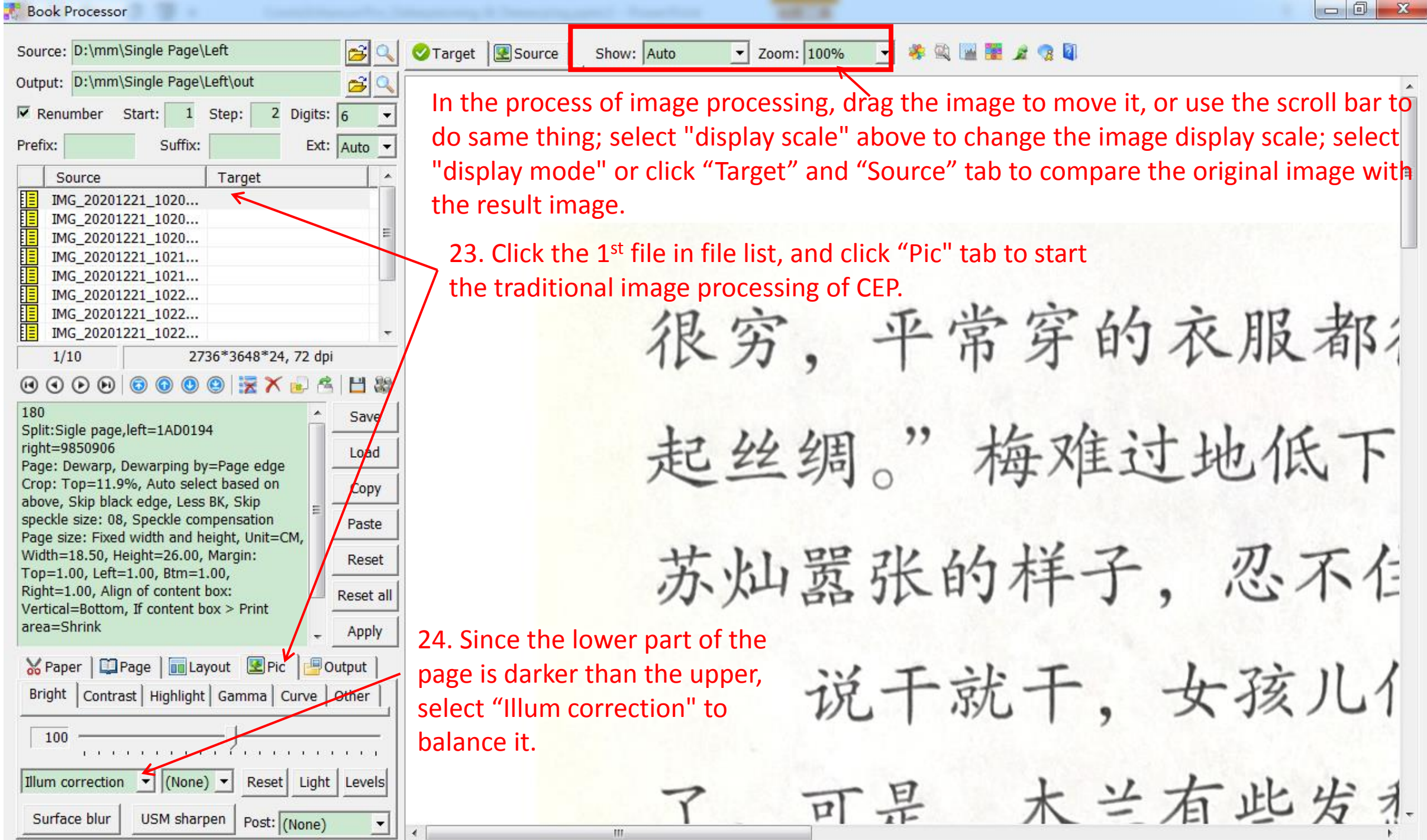
木兰赶紧热情地把梅请进屋里。很快，梅就用地那双灵巧的手帮

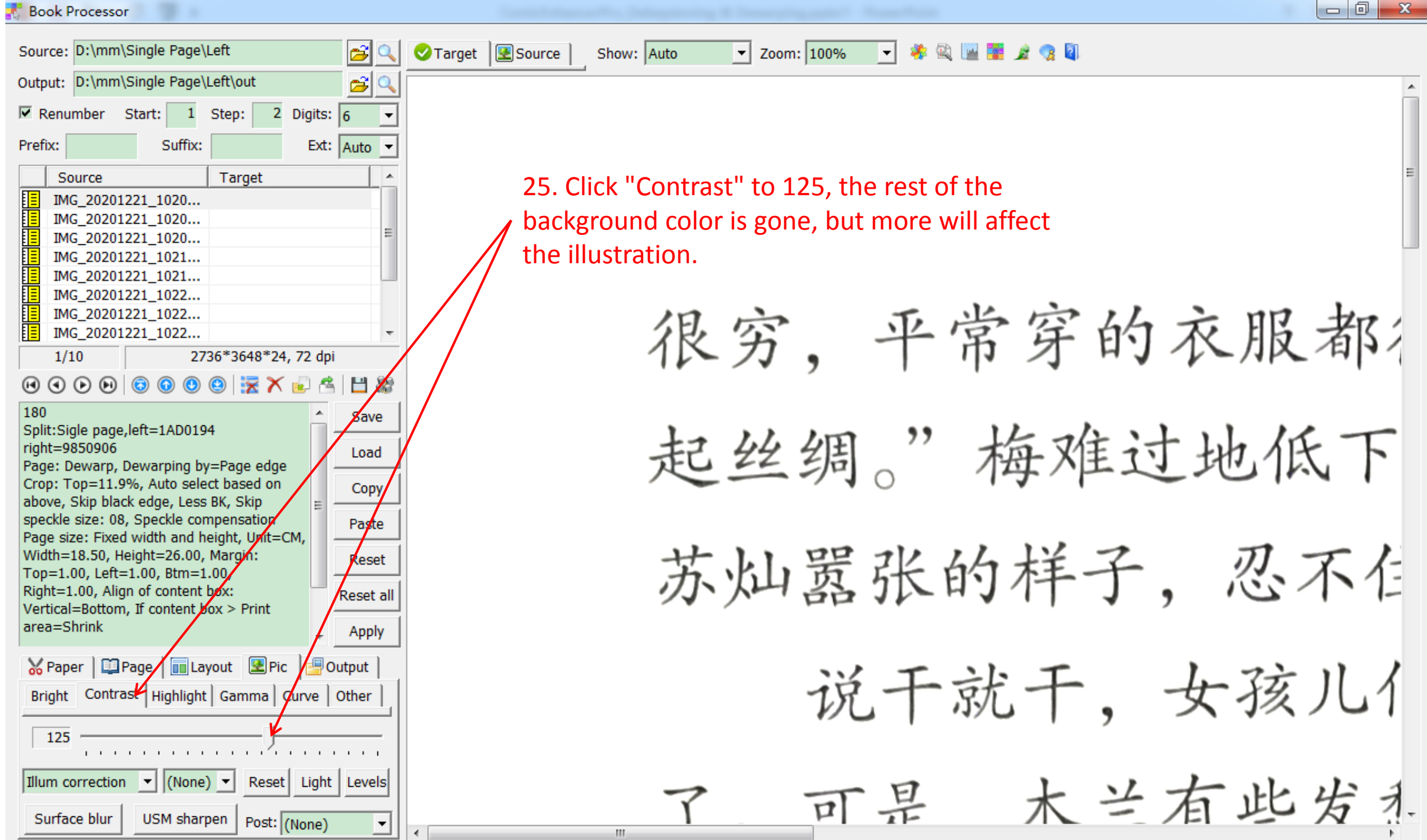
200

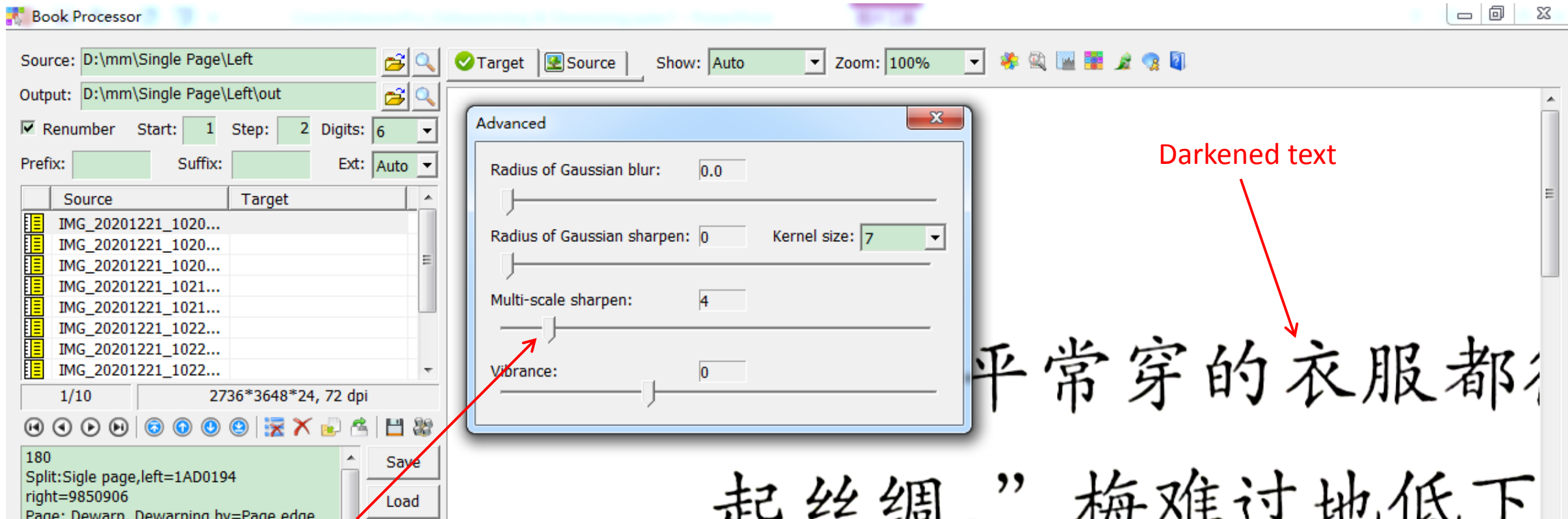


22. Stay in the "Layout" tab and click the "Apply" button to apply the settings of current tab to other images.

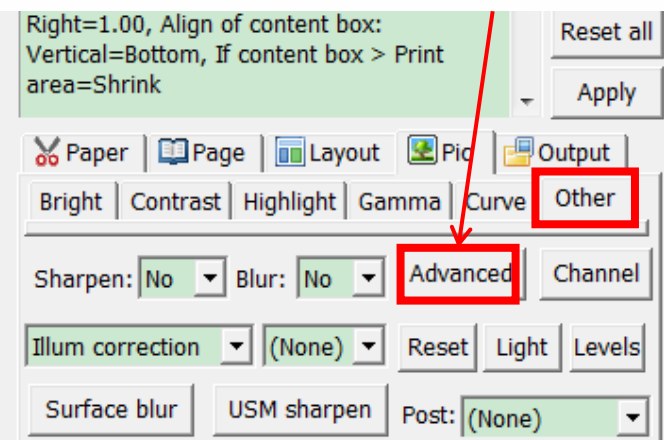


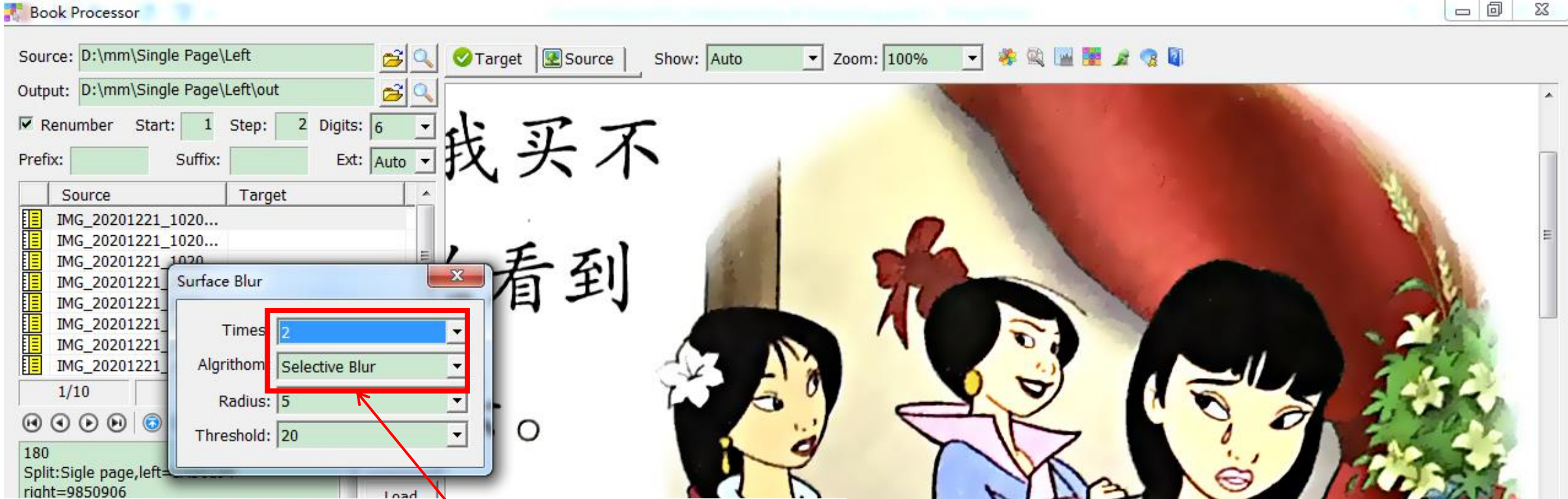




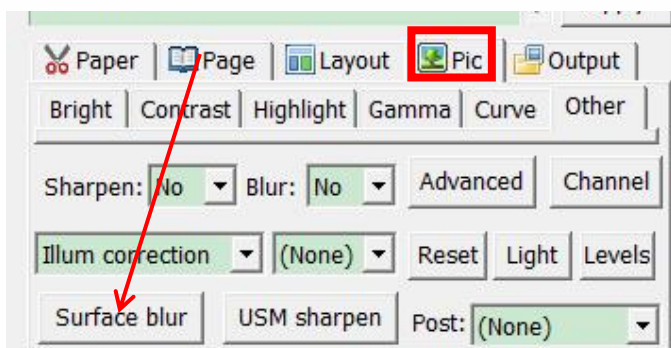


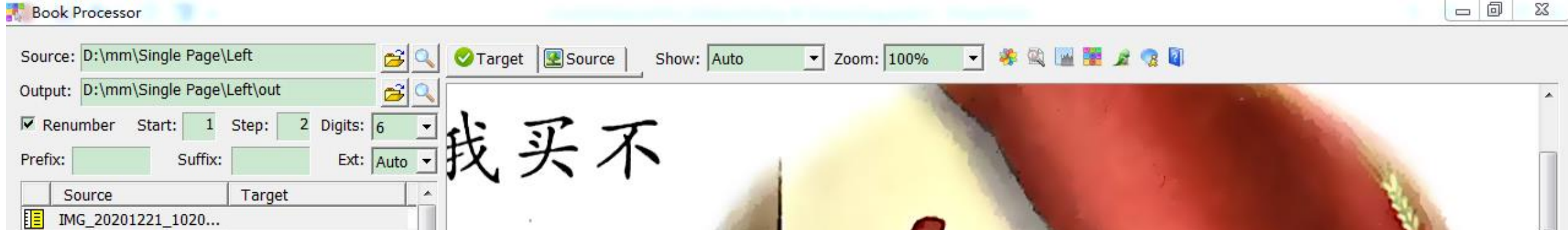
26. In the "other" page, click the "Advanced" button and click "Multi-scale sharpen" to 4. The whiten text caused by contrast is darkened, and some fuzzy text is sharpened.



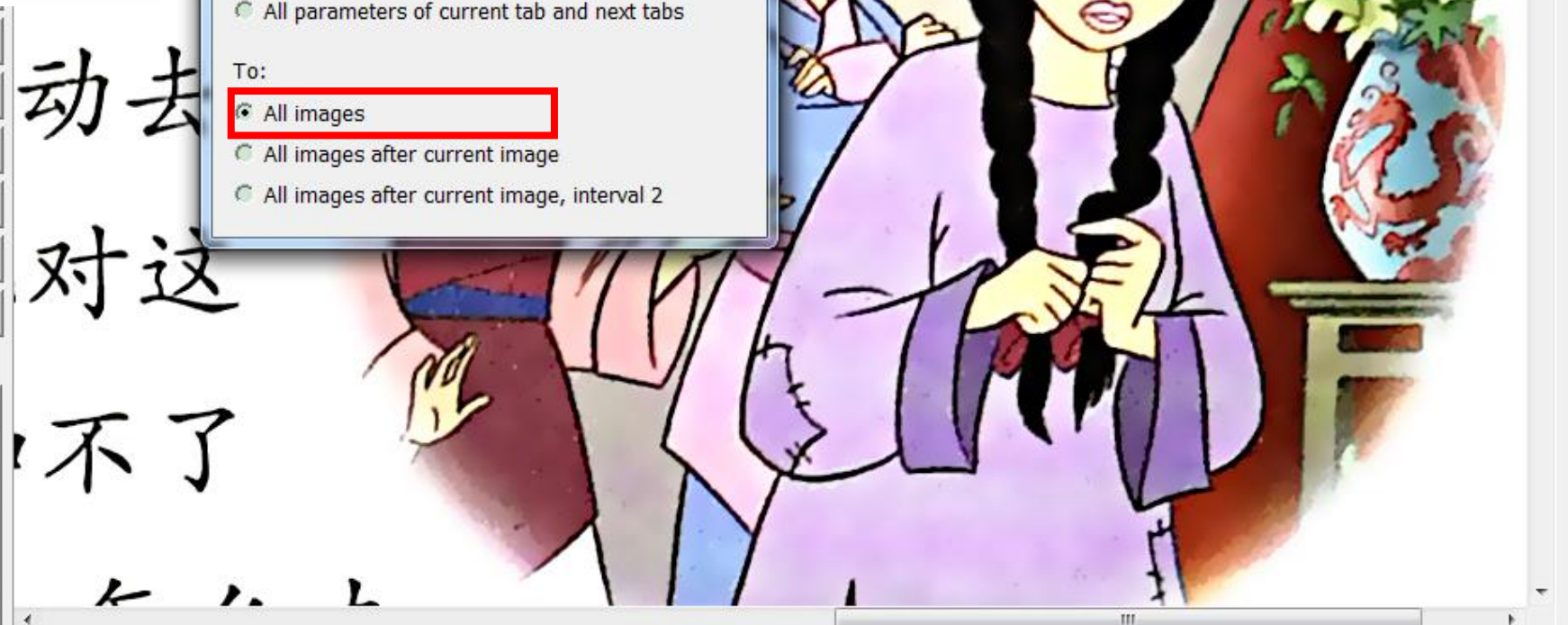
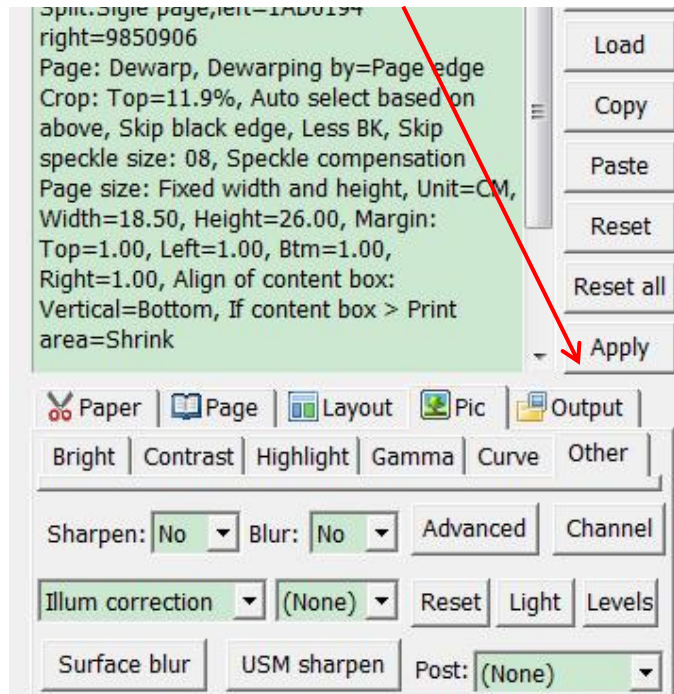


27. When the zoom is 100%, you can see since too many pixels are inserted into the poor size of phone sensor, resulting in a lot of noise in the image. So click the "surface blur" button to smooth the image. In the "surface blur" dialog box, select the relatively fast "selective blur" for "algorithm", and select "2" for "times".

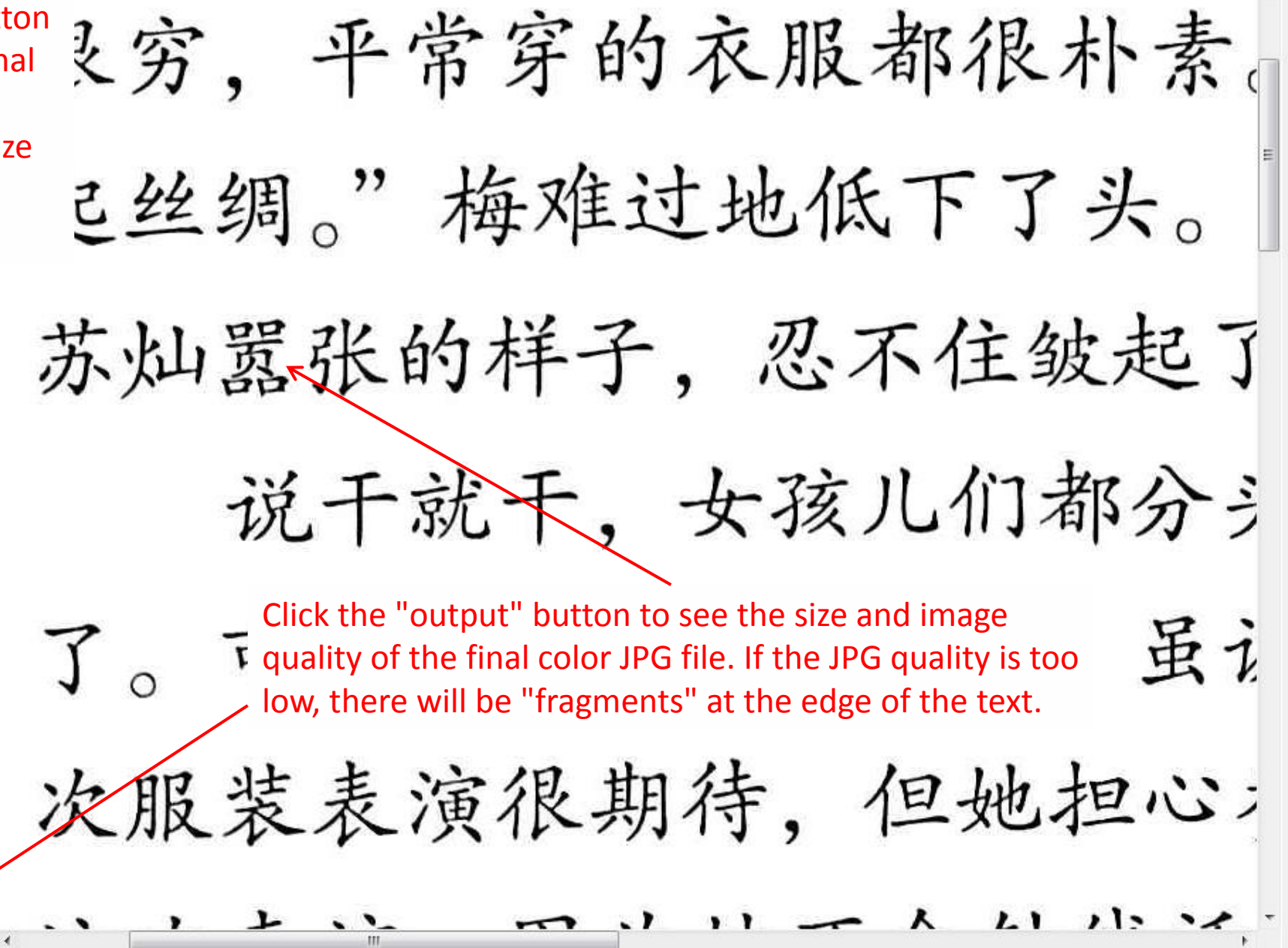
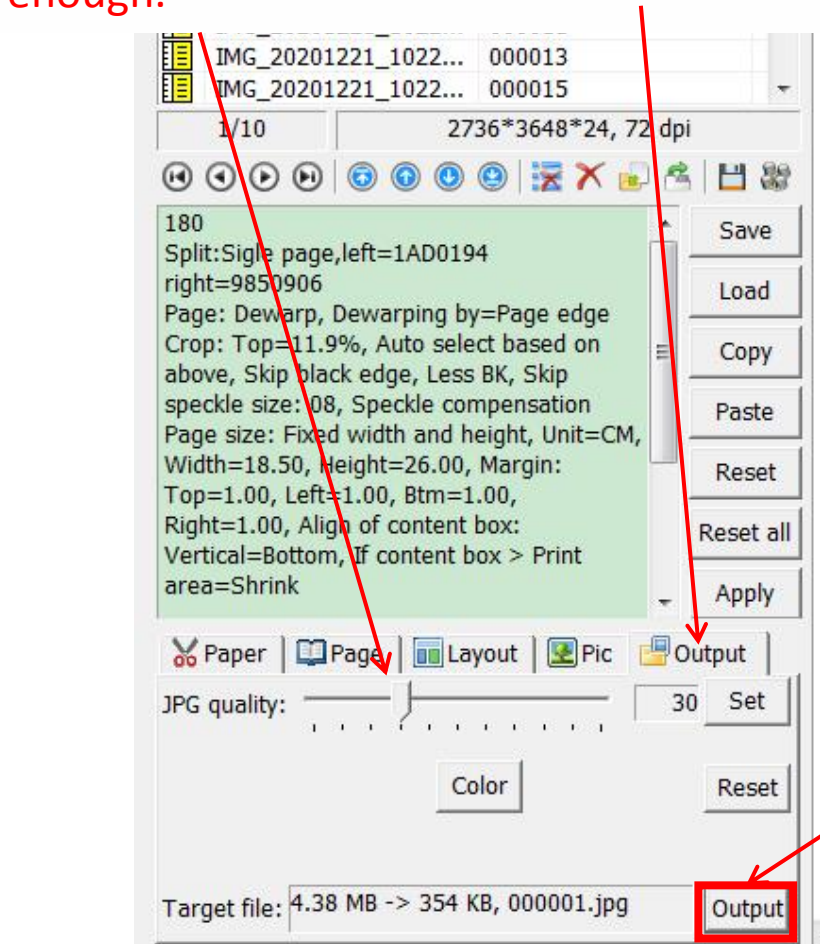




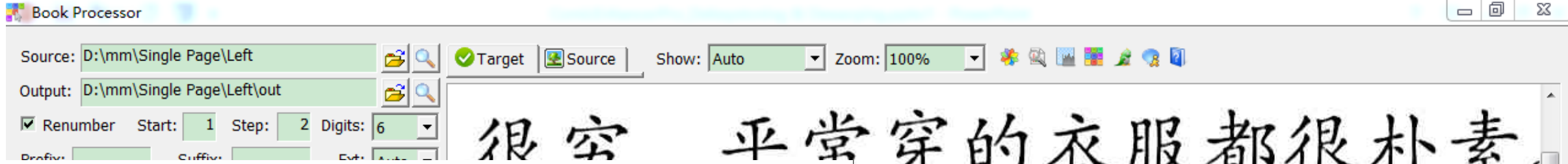
28. Click "Apply" button to apply "All parameters of current tab" to "all images". Then double-click the left or right side of the preview window to turn the page back and forth to see the effect of other pages. If find any problem, adjust parameters for that page.



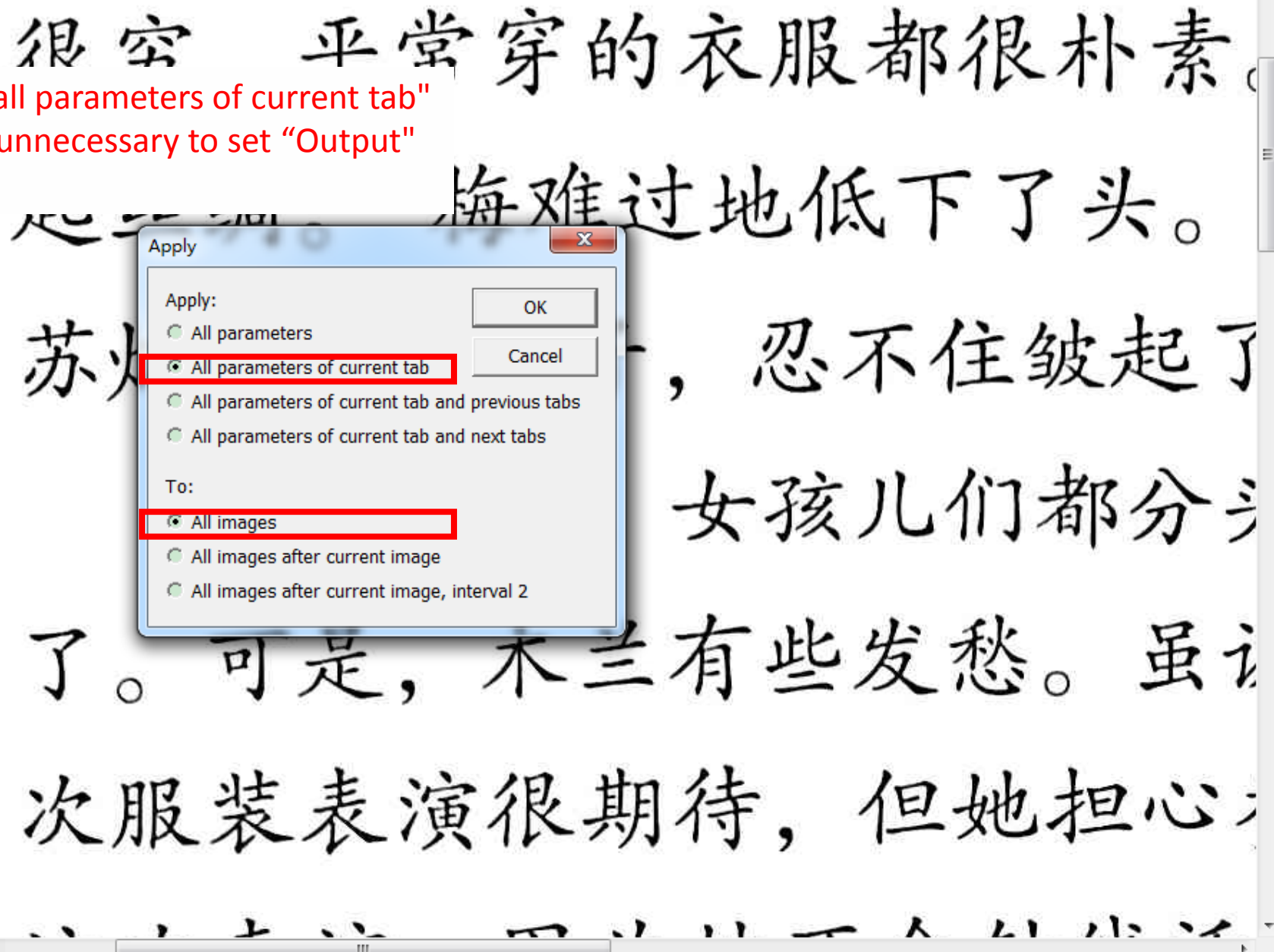
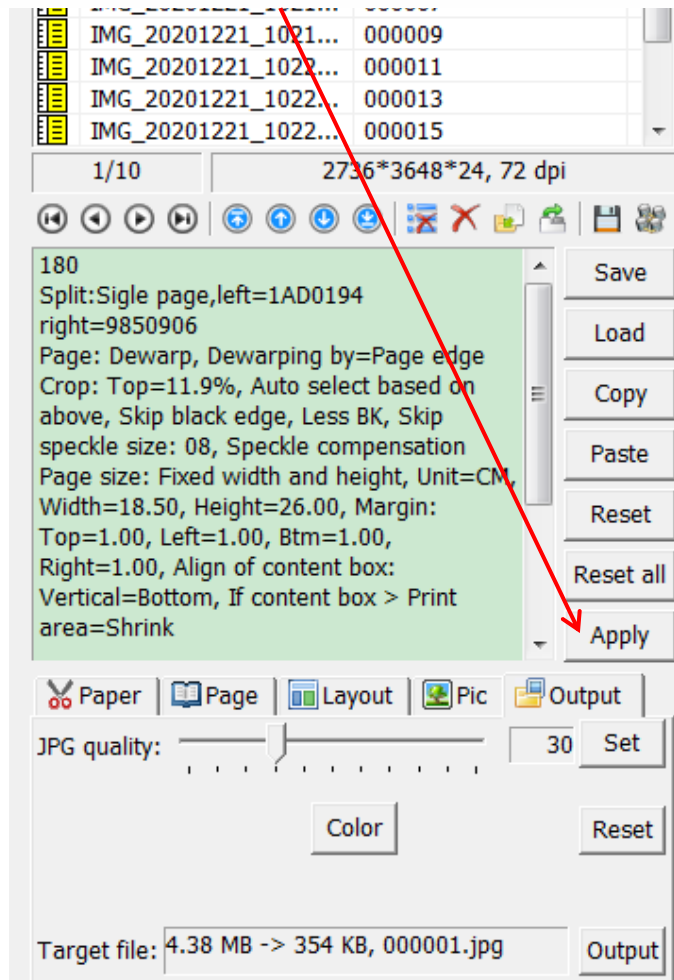
29. In "output" tab, click the "output" button to see the size and image quality of the final JPG file, then adjust the "JPG quality" to select the value that the quality and file size can balance. For these clean images, 30 is enough.

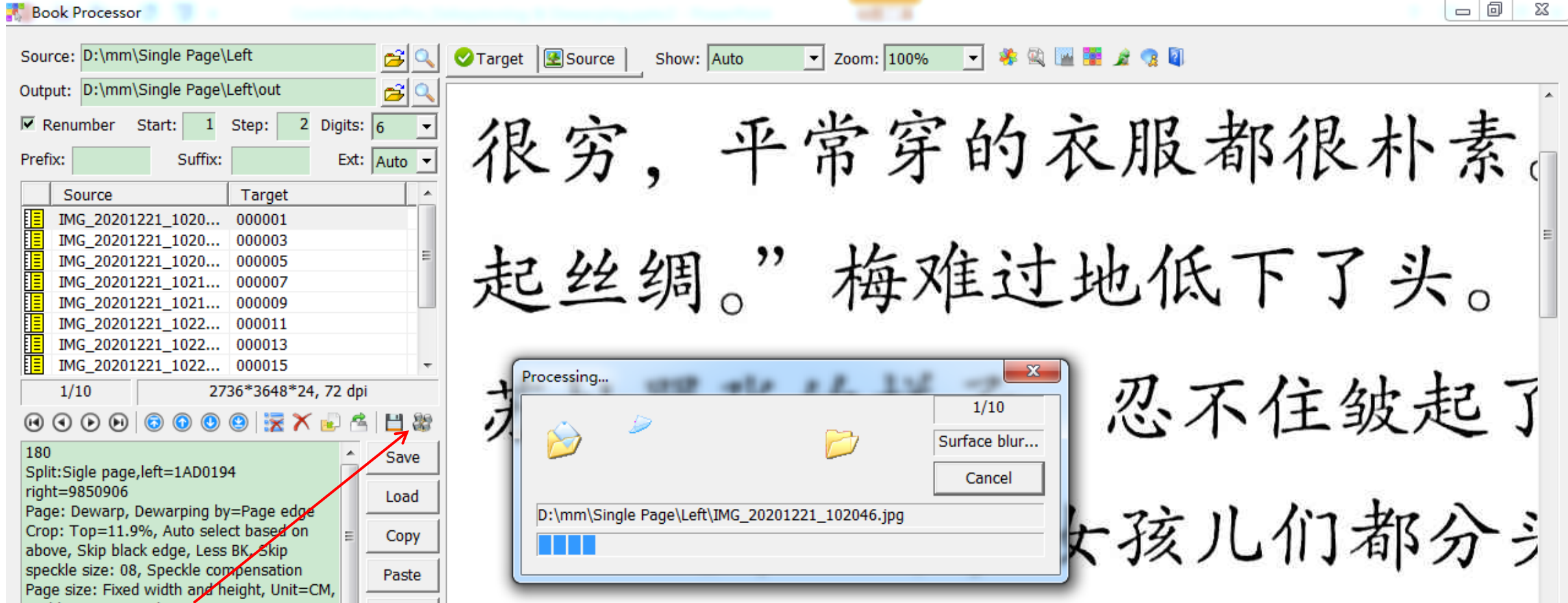


Click the "output" button to see the size and image quality of the final color JPG file. If the JPG quality is too low, there will be "fragments" at the edge of the text.

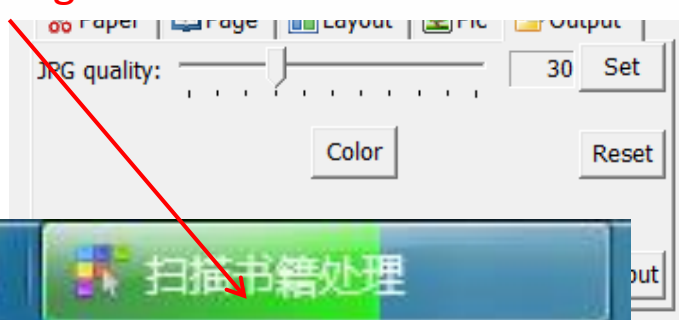


30. Click the "Apply" button and select "all parameters of current tab" to apply to "all images". In this way, it is unnecessary to set "Output" page by page.

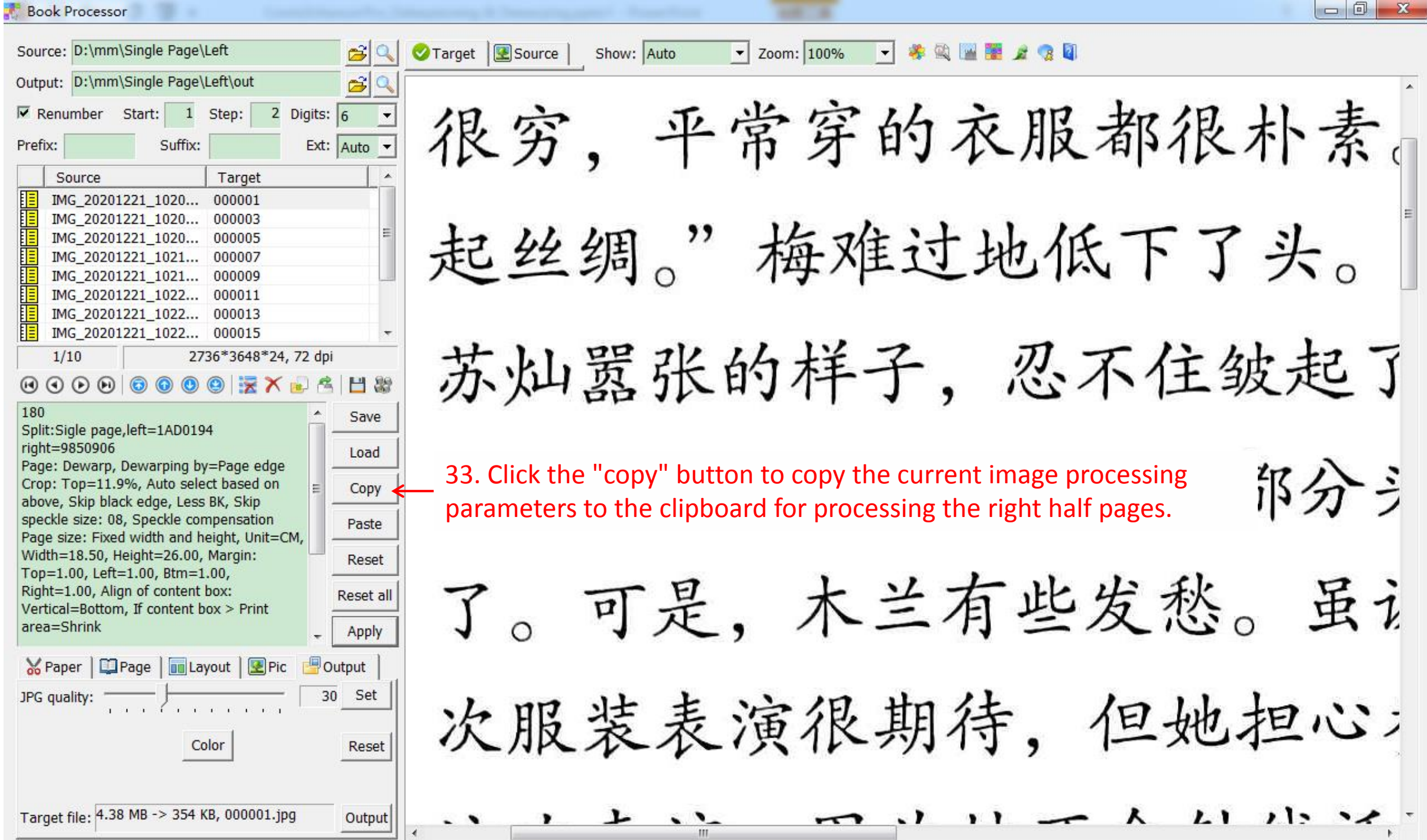


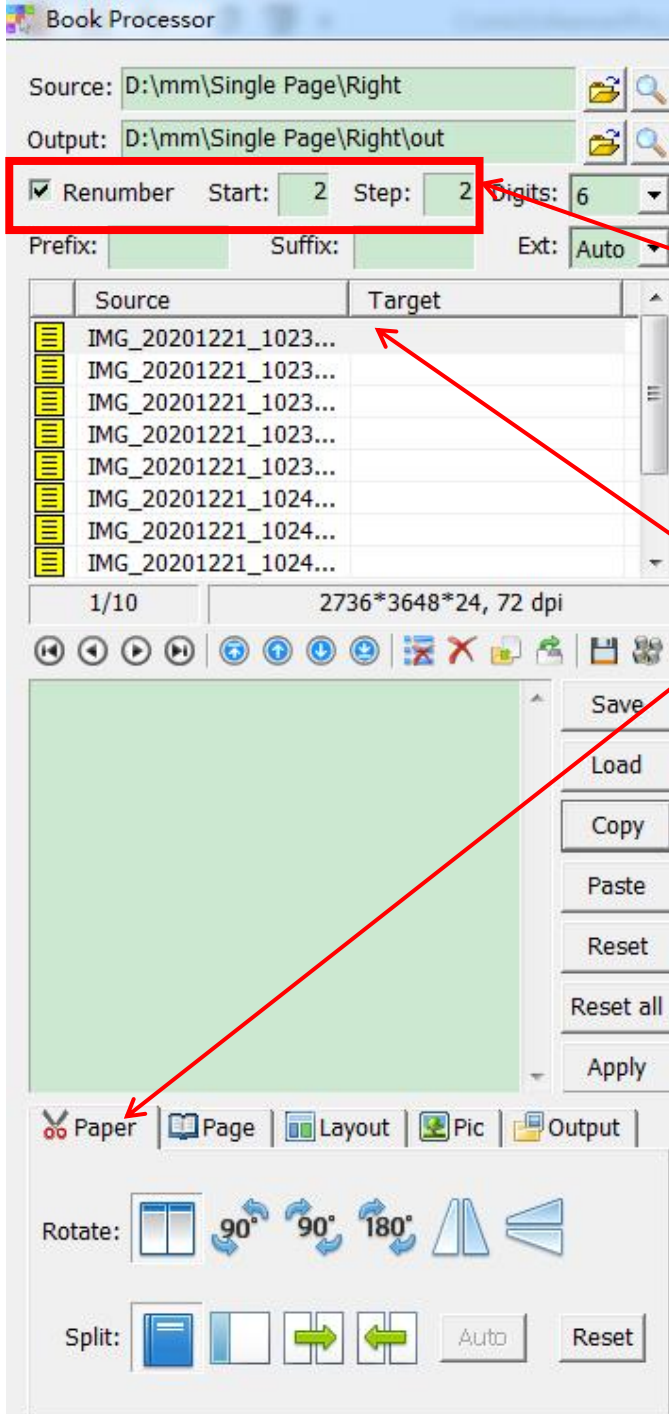


31. Click the "batch process" button on the middle toolbar to start batch process until the progress bar on the taskbar is full.



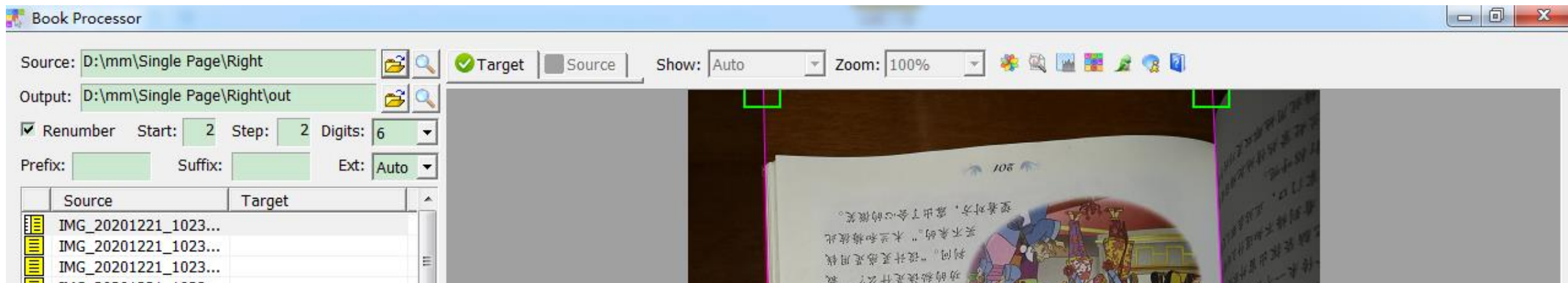
32. Use an image browser (such as ComicsViewer) to quickly view the output images. If you feel that an image is not satisfactory, you can adjust the processing parameters of the image separately. After adjustment, click the "output" button in the "output" tab to output the page separately.



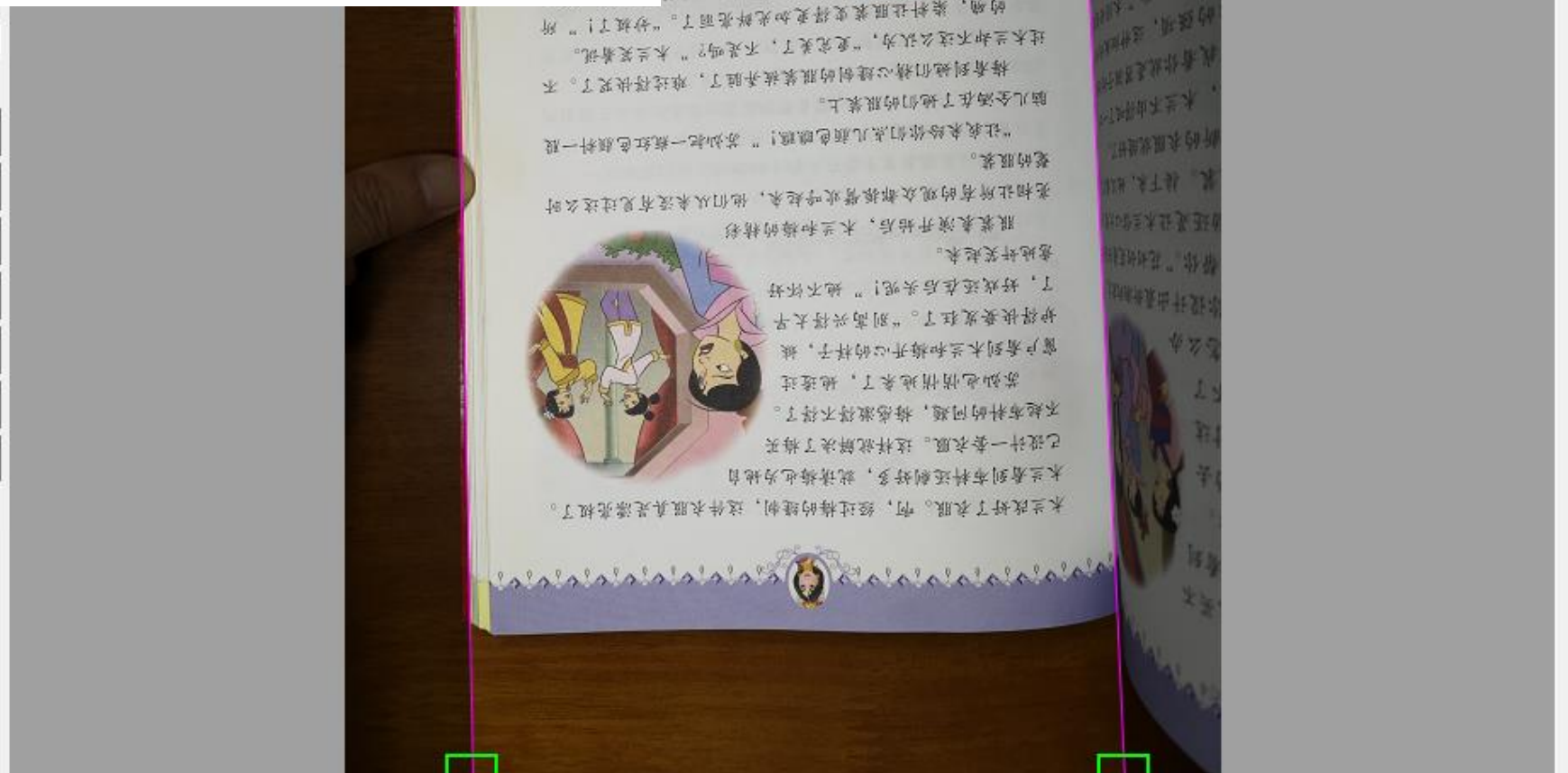
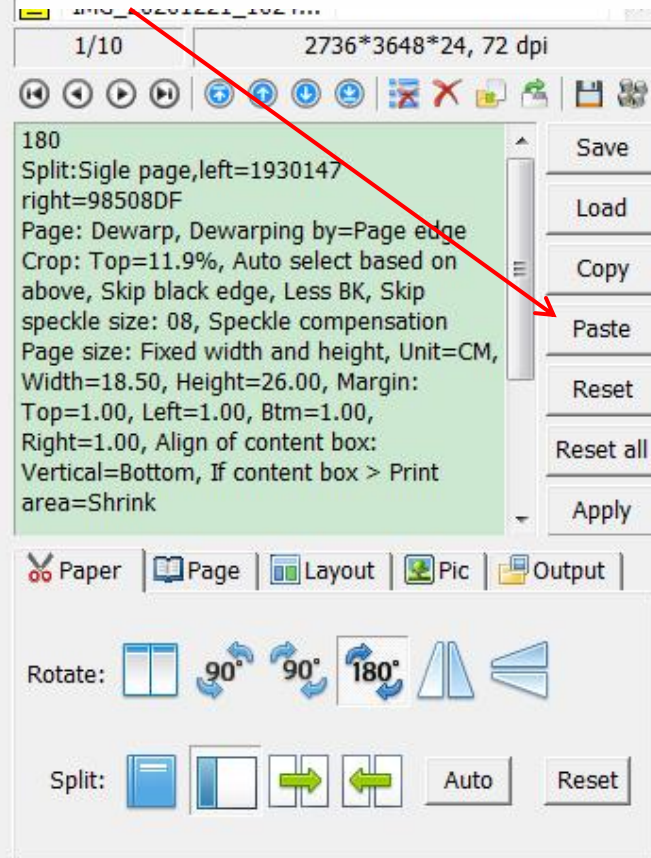


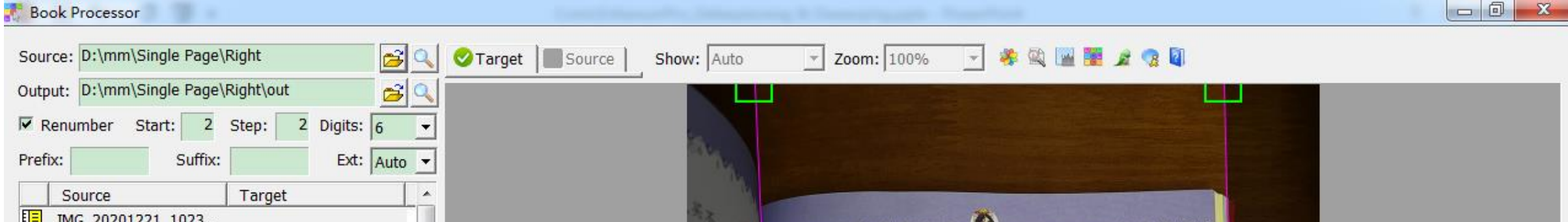
35. After filling in, check "Renumber". Under normal circumstances, the right side of a book should have odd pages, that is, the "start" is 1, and the "step" is 2. However, because this sample is shot from the middle, and the right half is even pages, the "start" is 2, and the "step" is 2.

34. Click "Paper" tab, drag the "right" subfolder from the Explorer to the CEP window to open it. CEP will fill the file list and display the first page.

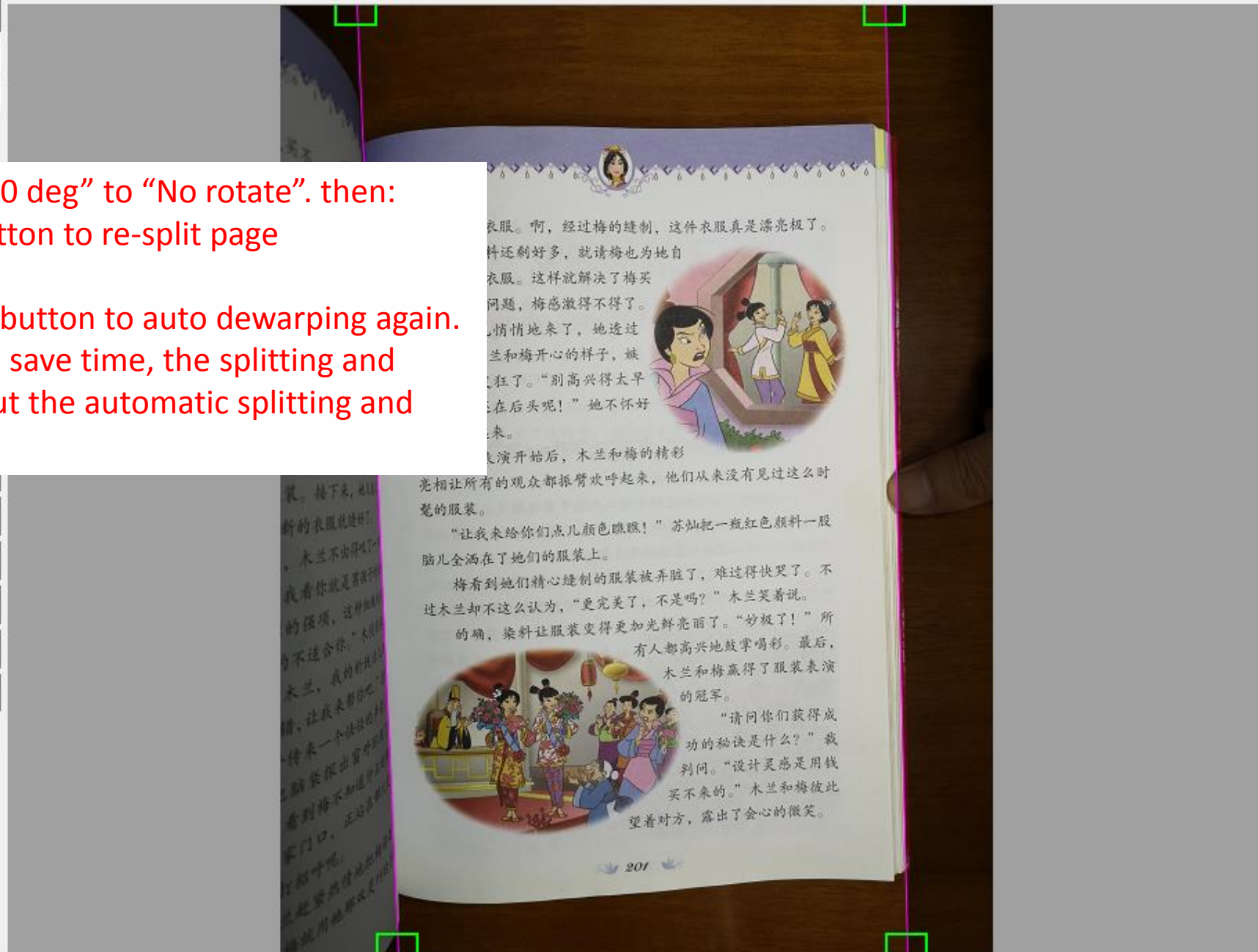
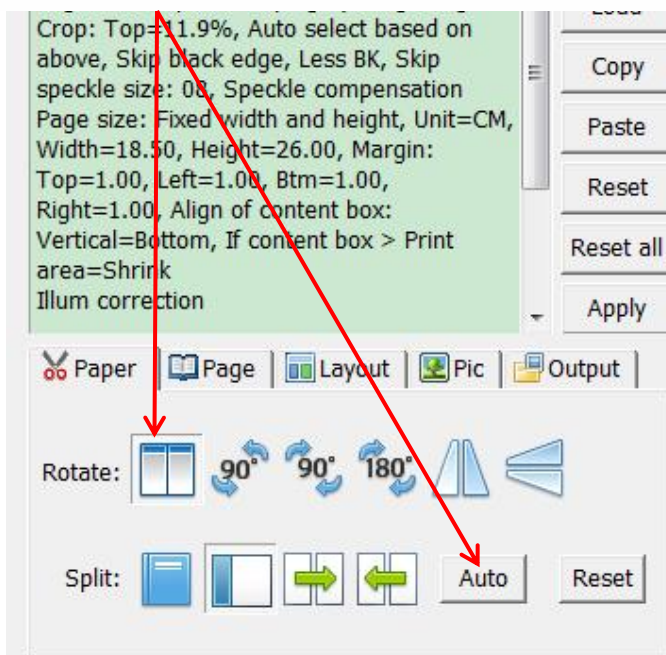


36. Click "paste" button to paste the processing parameters of the previous left pages from the clipboard.





37. Change "Rotate" from "Rotate 180 deg" to "No rotate". then:
- 1) In the "**Paper**" tab, click "Auto" button to re-split page automatically.
 - 2) In the "**Page**" tab, click the "Auto" button to auto dewarping again.
- The reason is very simple: in order to save time, the splitting and dewarping parameters are pasted, but the automatic splitting and dewarping functions are not called.



Source: D:\mm\Single Page\Right

Output: D:\mm\Single Page\Right\out

☒ Renumber Start: 2 Step: 2 Digits: 6

Prefix: Suffix: Ext: Auto

Source	Target
IMG_20201221_1023...	
IMG_20201221_1023...	
IMG_20201221_1023...	
IMG_20201221_1023...	
IMG_20201221_1023...	
IMG_20201221_1024...	
IMG_20201221_1024...	
IMG_20201221_1024...	

1/10

2736*3648*24, 72 dpi



Split: Single page, left=1C70128, right=96B0912

Page: Dewarp, Dewarping by=Page edge
Crop: Top=11.9%, Auto select based on above, Skip black edge, Less BK, Skip speckle size: 08, Speckle compensation
Page size: Fixed width and height, Unit=CM, Width=18.50, Height=26.00, Margin: Top=1.00, Left=1.00, Btm=1.00, Right=1.00, Align of content box: Vertical=Bottom, If content box > Print area=Shrink
Illum correction

Load

Copy

Paste

Reset

Reset all

Apply

Paper Page Layout Pic Output

Auto Dewarping by:
Auto1 Page edge

Size: Auto

Size Illum: Normal

Scale: 16:9

Split page before dewarping!

Result: 2116 * 3648

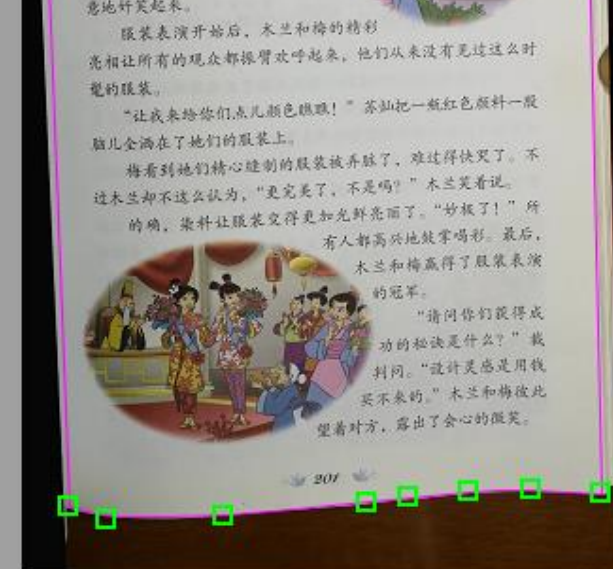
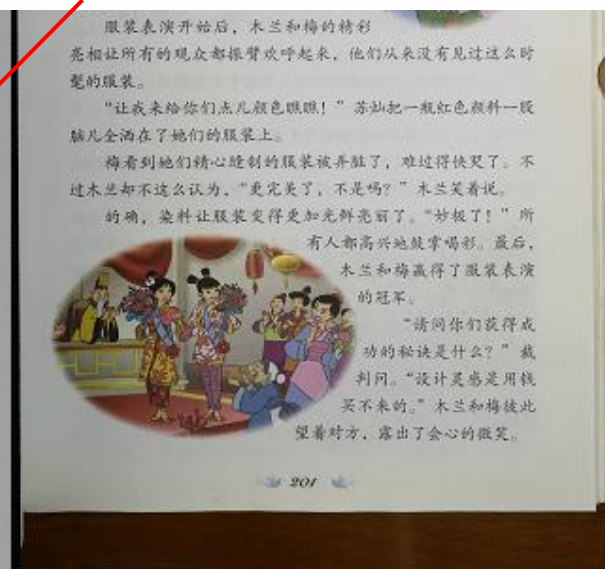
Reset

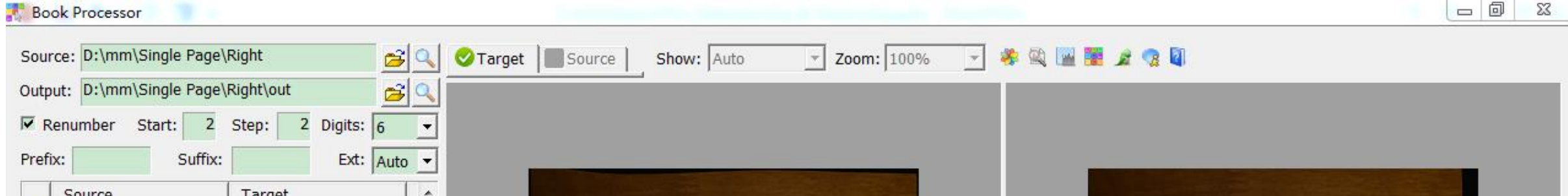
Grid: No

Target Source Show: Auto Zoom: 100%

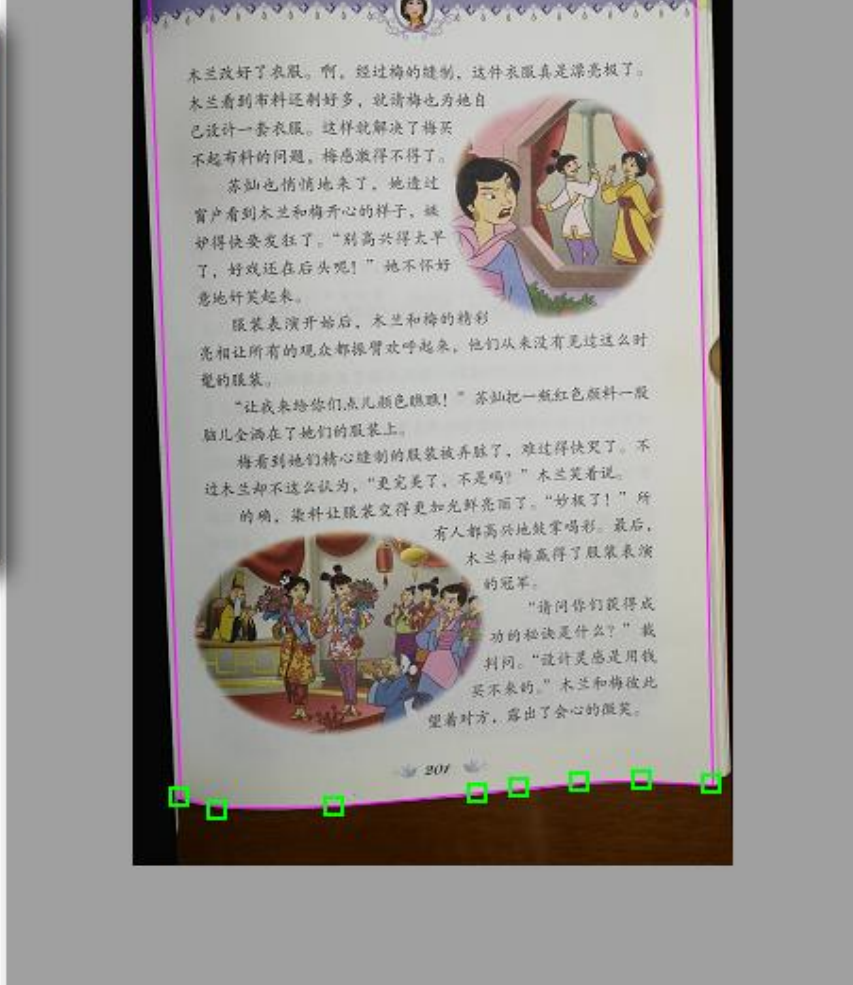
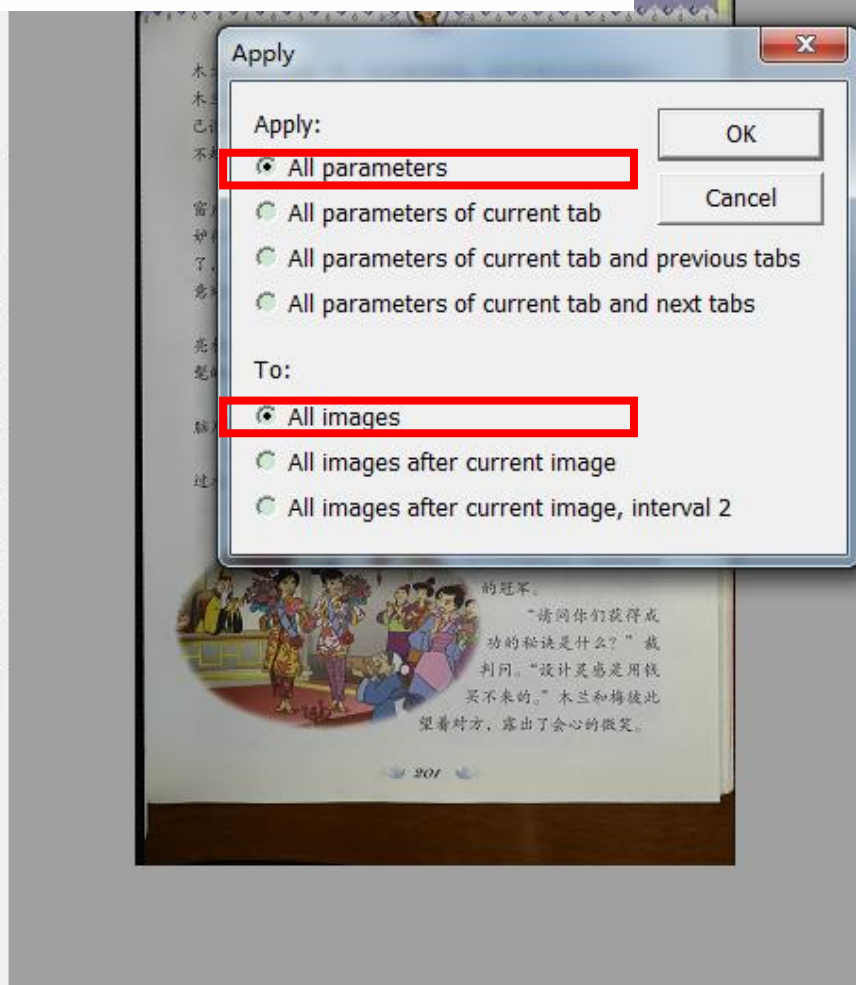
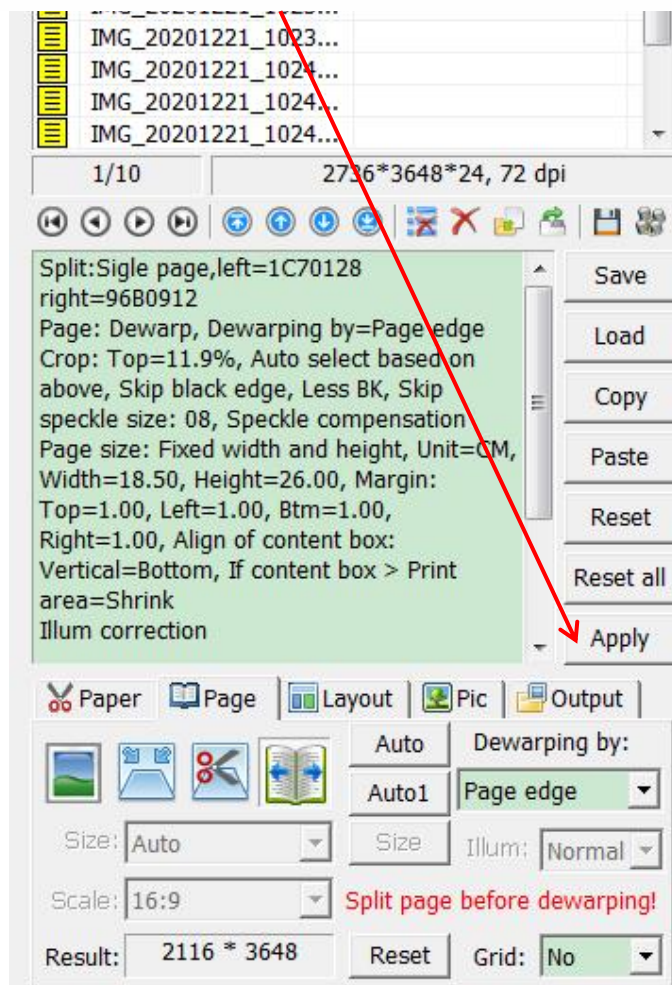


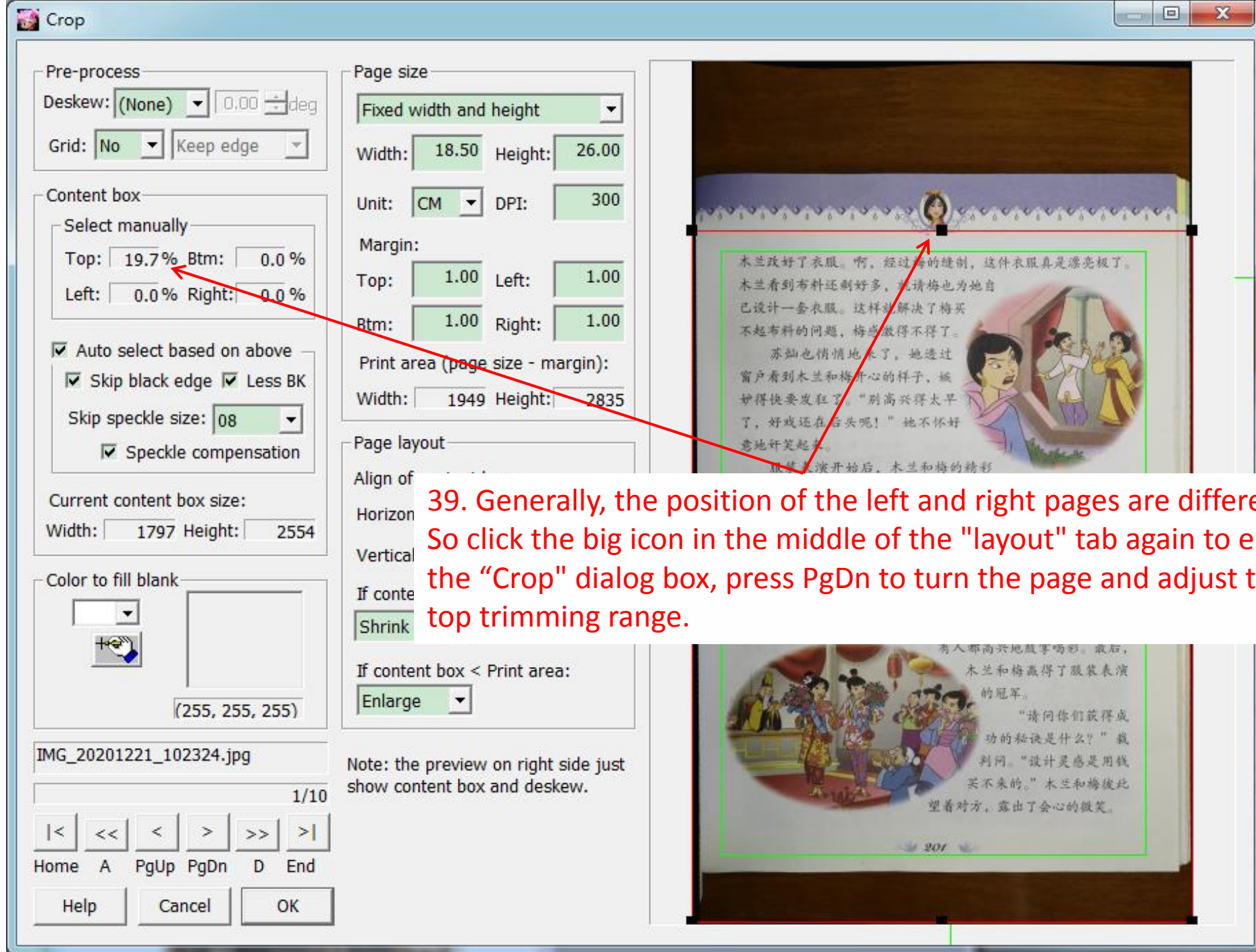
In the "page" tab, click "auto" button to auto dewarping again.

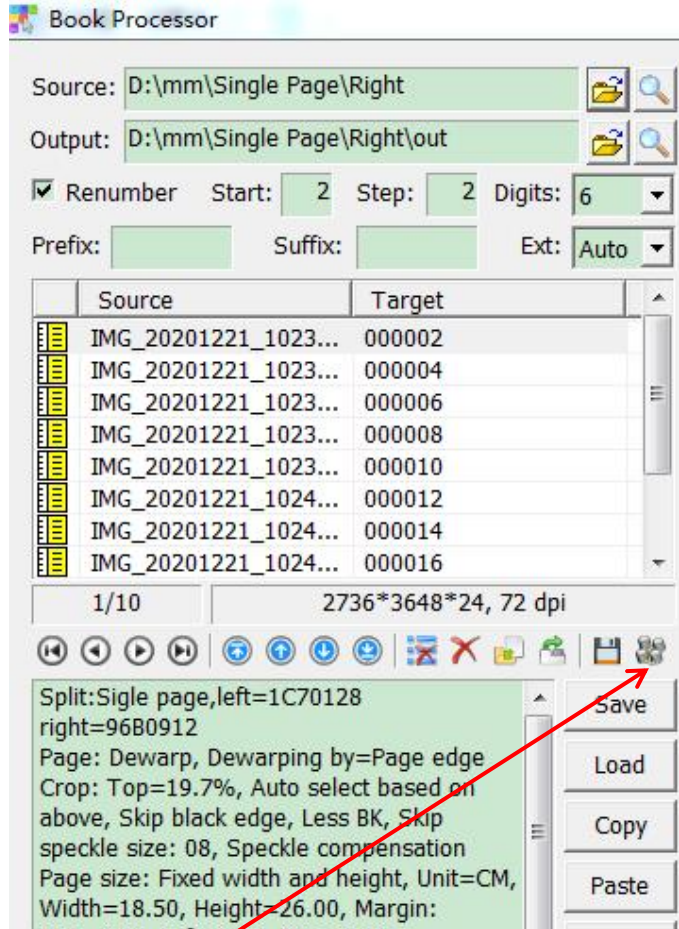




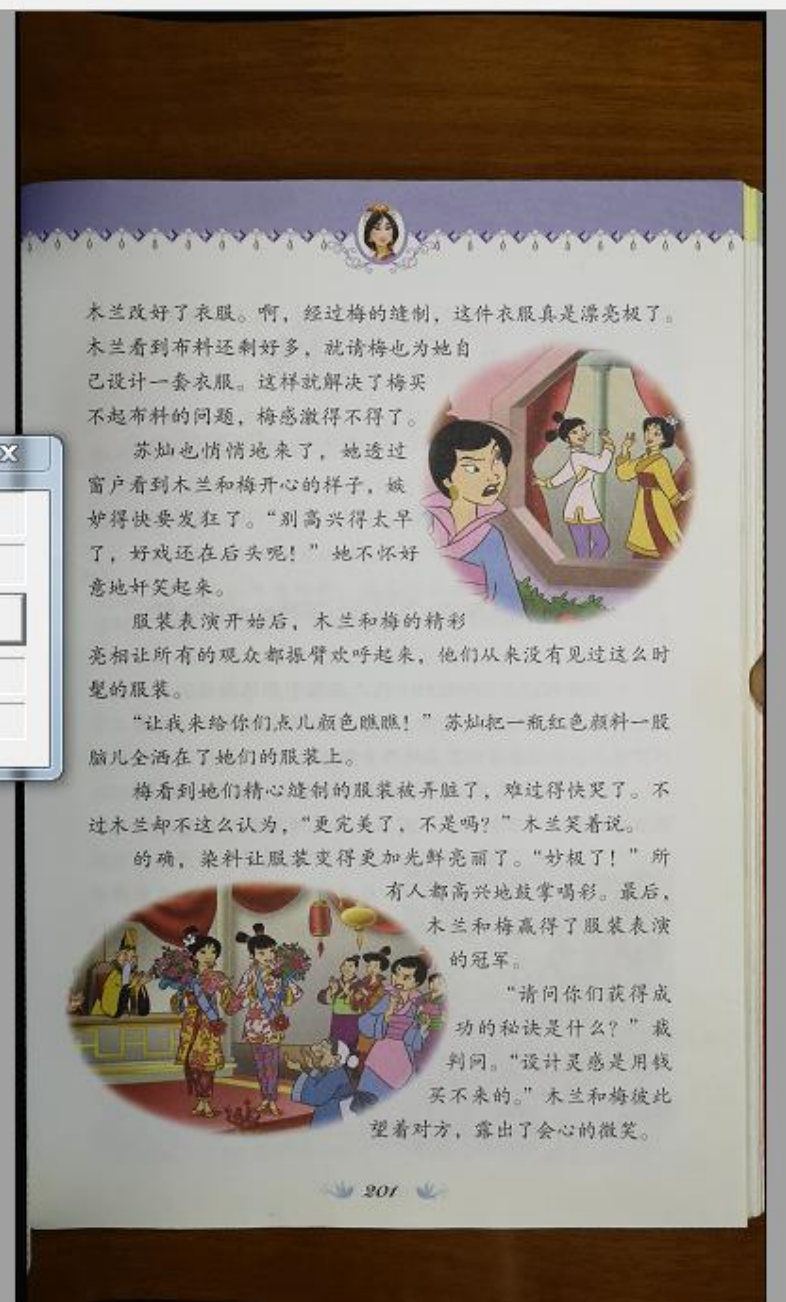
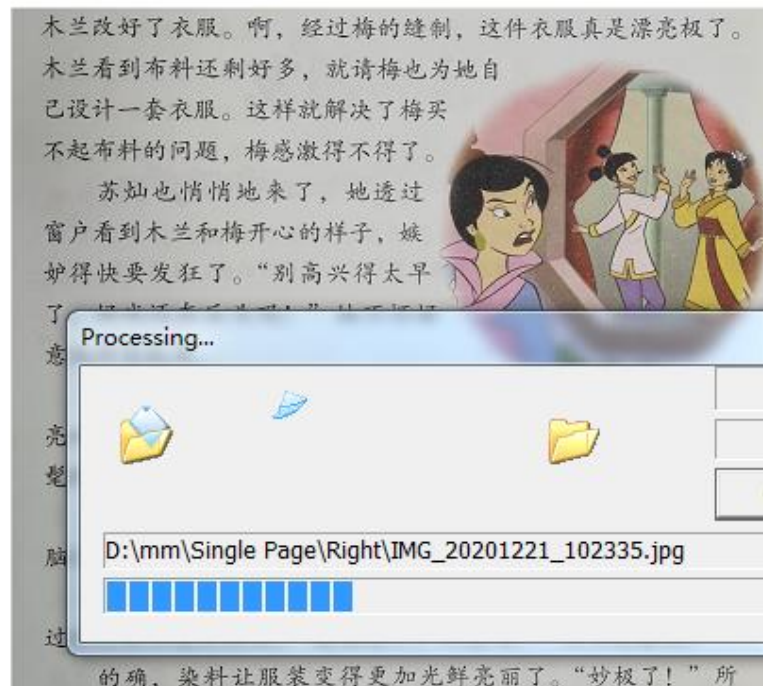
38. Click the "Apply", apply "all parameters" to "all images". So the pasted parameters are copied to all pages.





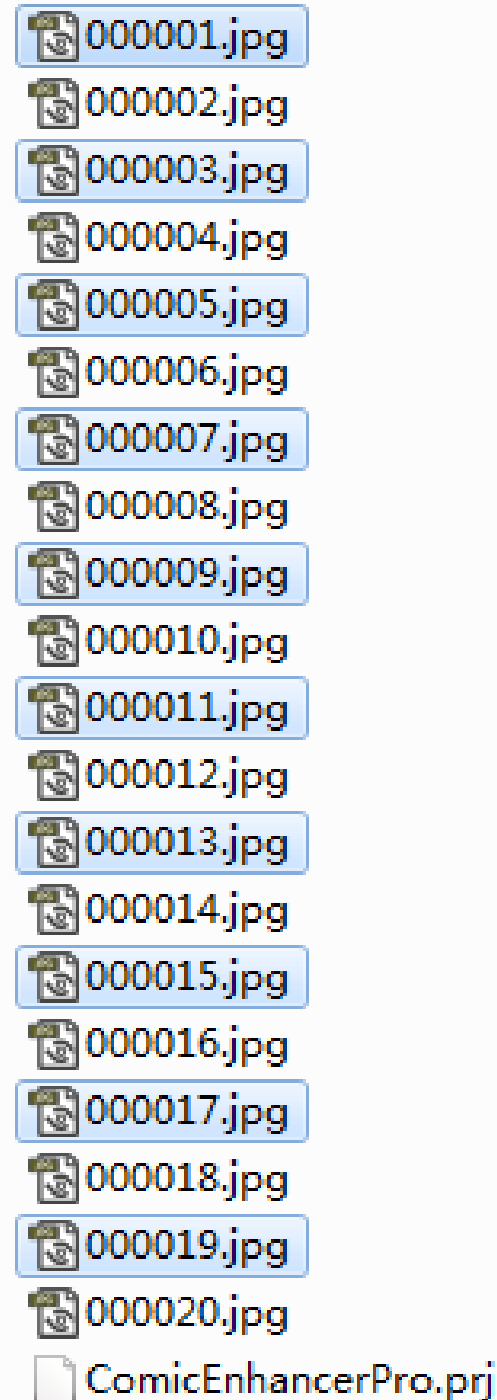


40. Click "Batch Process" button, and then patiently wait for CEP task on the taskbar at the bottom of the desktop to fill the green progress bar.



41. Image process finished. Move the result files in the out subfolders of the left and right folders to the same folder. Because the file numbers are staggered, there is no overlap.

42. According to your need, use freepic2pdf to convert to double-layer PDF, or DjVuToy to DjVu.



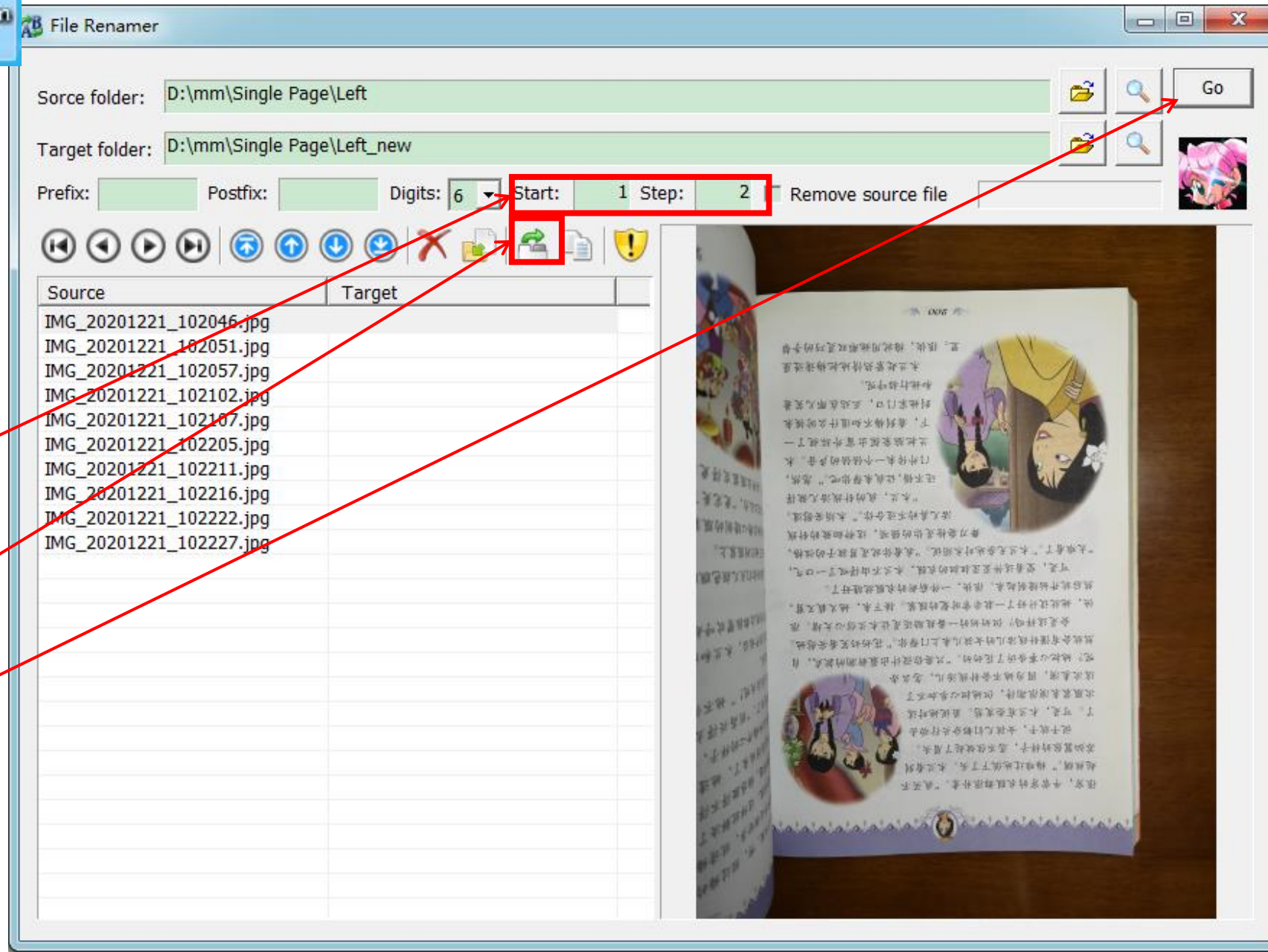
More Tips

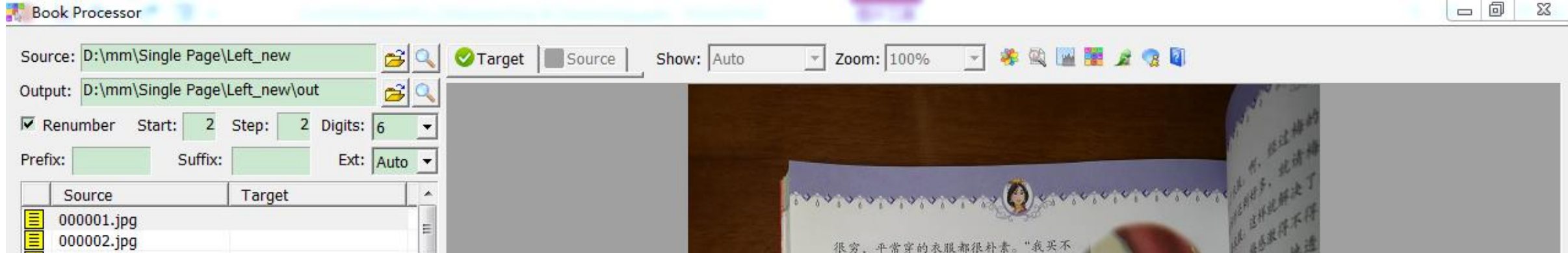


In this chapter, separate the left and right pages. If you want to merge them first, you need to renumber the files before.

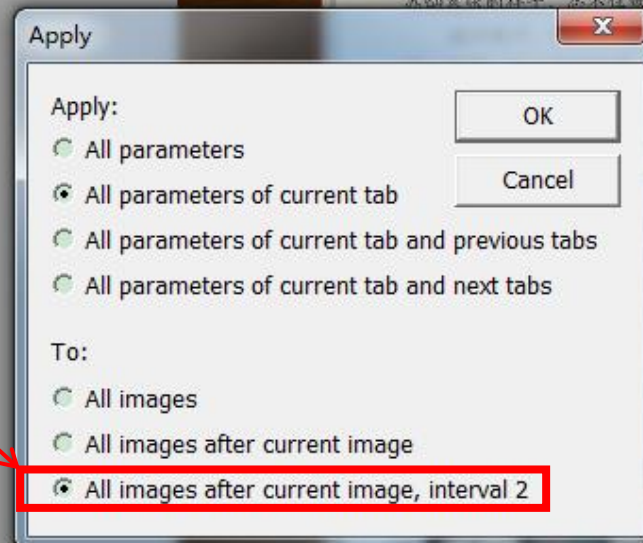
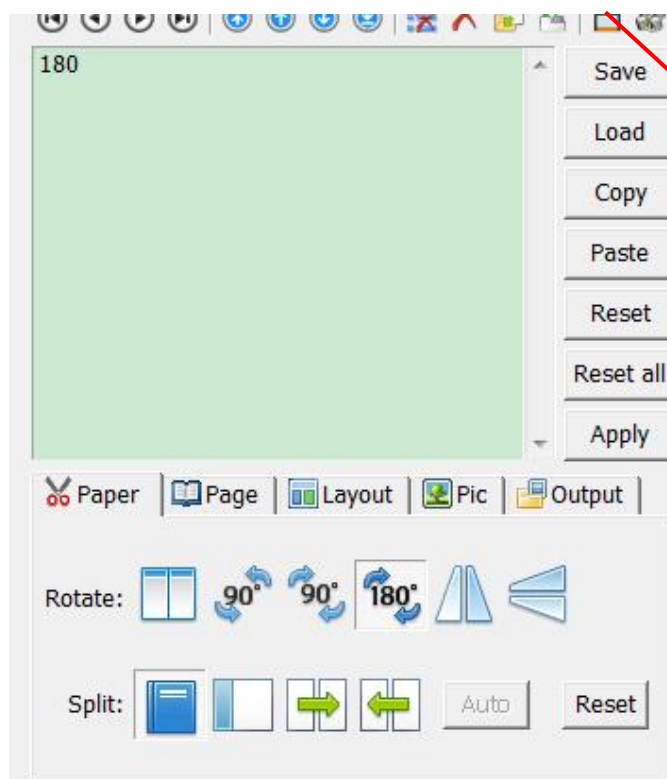
1. Double click "CEP_Renamer" shortcut on the desktop, start CEP and enter the file renamer.
2. Drag and drop the folder that needs to be renumbered from the Explorer and click OK.
3. For start number, fill in 1 for odd pages, 2 for even pages, and 2 for all steps.
4. Click the "renumber" button on the toolbar to number the files in the list.
5. Click "Go" button to start renumbering.

After the left and right pages are renumbered, move files to the same folder and start processing.





After the files are merged, in the paper tab of CEP, in the "Apply" after selecting "rotate 180 deg", the "to" item must select "all images after current image, interval 2".





Thanks!

Just for our common interest!

stronghorse_mj@hotmail.com

<http://www.mediafire.com/folder/f0z2hexqdnr9a/Software>