Simple Manga Translator

-Jiali Huang (jihuan@iu.edu)

Background

-Manga is originated from Japan

-Manhua is originated from China, Taiwan, or Hong Kong

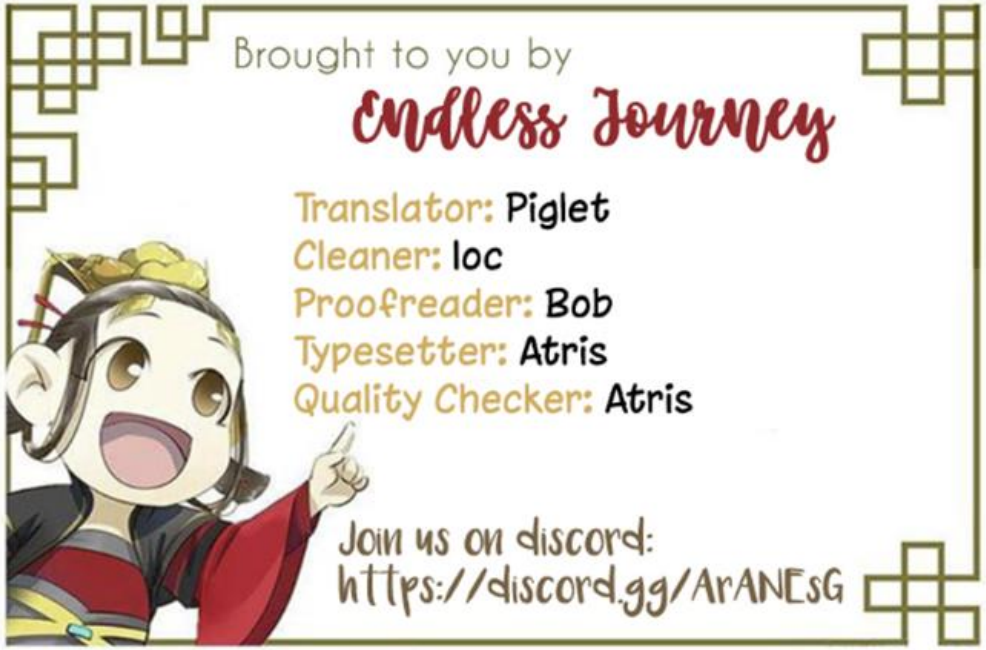
https://japaneseplease.com/product/demon-slayer-vol-4/?v=7516fd43adaa
https://www.kanzenshuu.com/2020/04/02/digital-full-color-editions-of-dragon-ball-super-manga-announced/
https://www.topmanhua.com/manhua/why-the-princess-acts-like-white-lotus/chapter-20/

Raw (Untranslated)

English Translated

Why Automate Manga Translation?

-Manga translation currently requires real manga translators



https://readmanganato.com/manga-fd982360/chapter-5

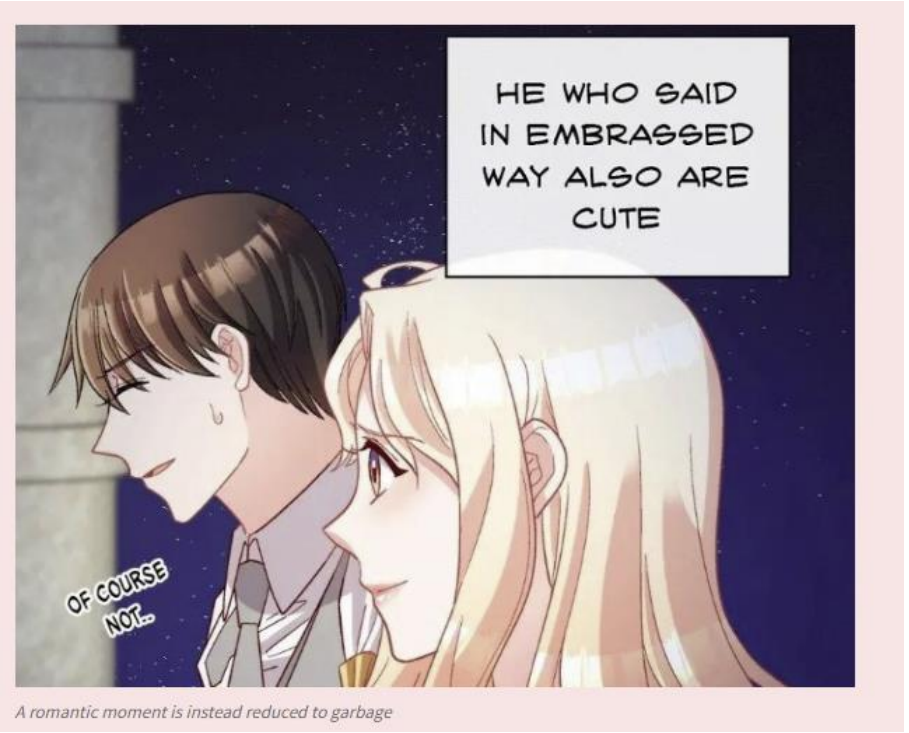
Why Automate Manga Translation?

-Hard to acquire a team to translate for non-mainstream manga (Active Recruiting!)

https://readmanganato.com/manga-fd982360/chapter-5

Why Automate Manga Translation?

-Non-mainstream manga more likely to have poor translation, especially manhua.



A romantic moment is instead reduced to garbage

https://readmanganato.com/manga-fd982360/chapter-5

Why Automate Manga Translation?

-No translator (google translate does not count) = no manga/manhua to read unless you know raw language

-Time invested goes to waste when translator team disappears

-ex. you are on chapter 120 (2-day manga-thon) then suddenly all chapters afterward have poor translation, sad goodbye.

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Manga Translator – 2 Part Problem

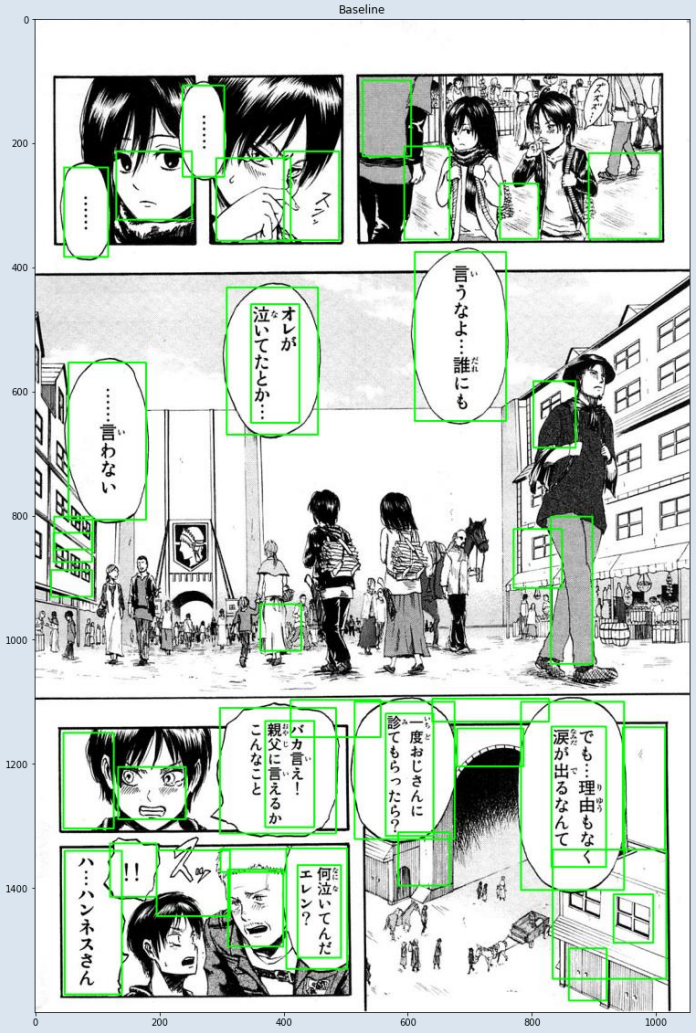
- Part 1: Image Segmentation
    - Find speech bubbles
    - Problems:
        - Unconventional speech bubbles
        - Sound effects have no bubbles
- Part 2: Translation
    - Convert speech bubbles to text
    - Problems:
        - Pronoun references
        - Semantics barrier (emotions)

Part 1: Image Segmentation

Baseline:

-Pre-Processing
  -Gaussian Blur
  -Dilation

-CV2 Contours
  -fixed thresholding

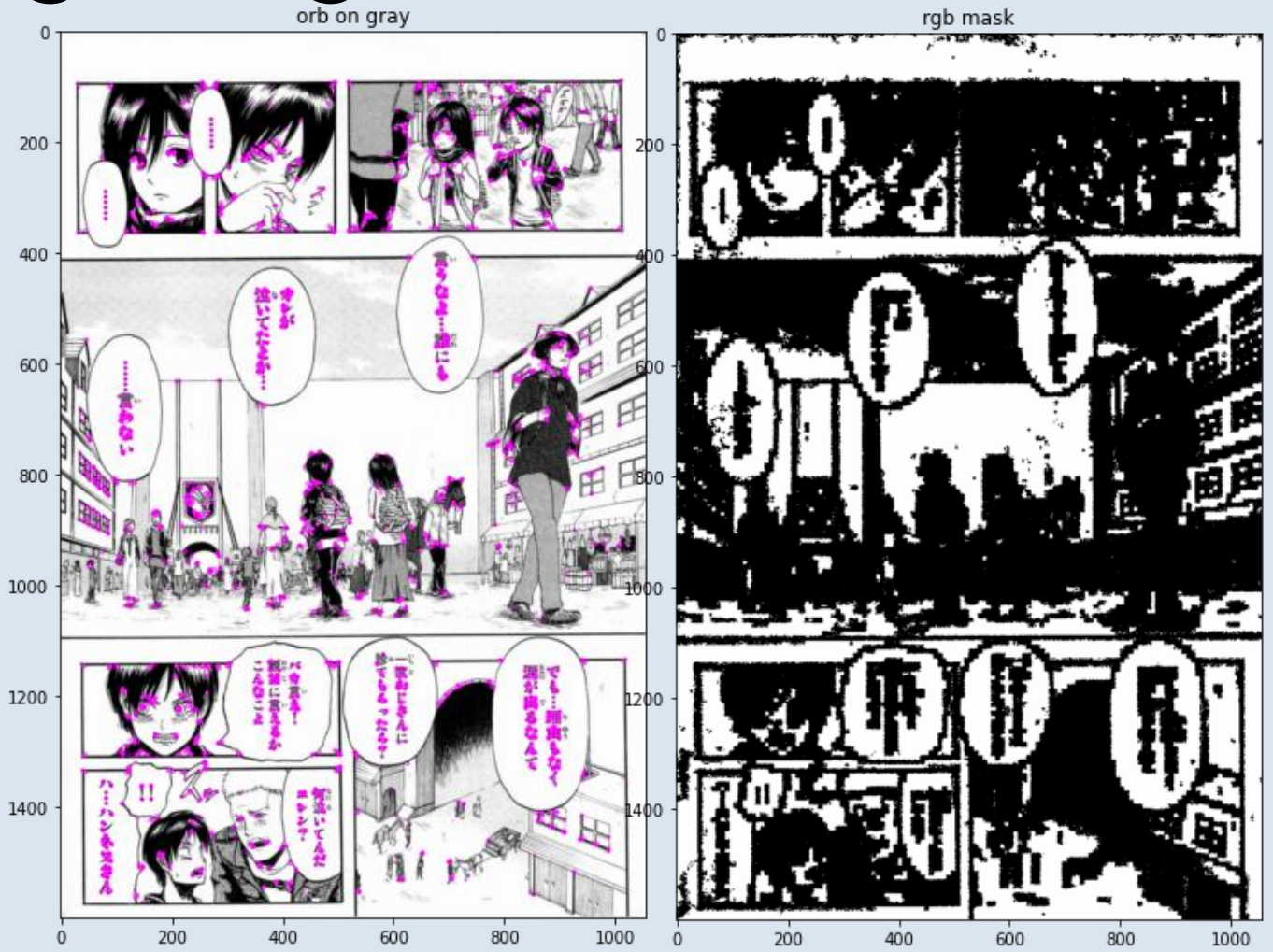


Part 1: Image Segmentation

Good Evidence:

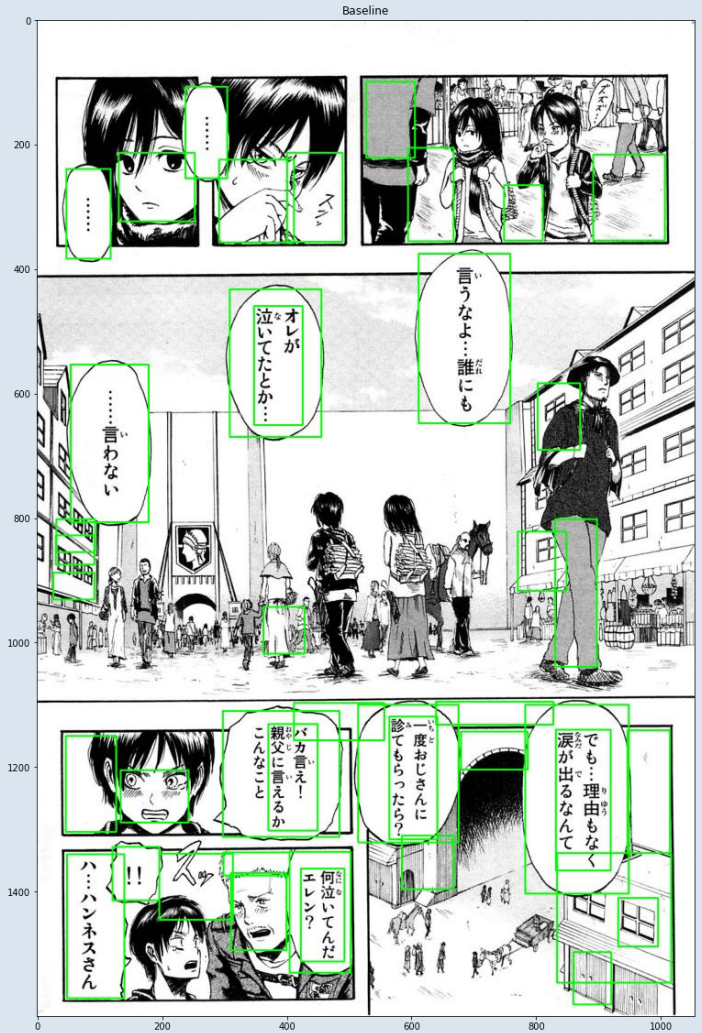
-ORB on image, key points clustered around text boxes

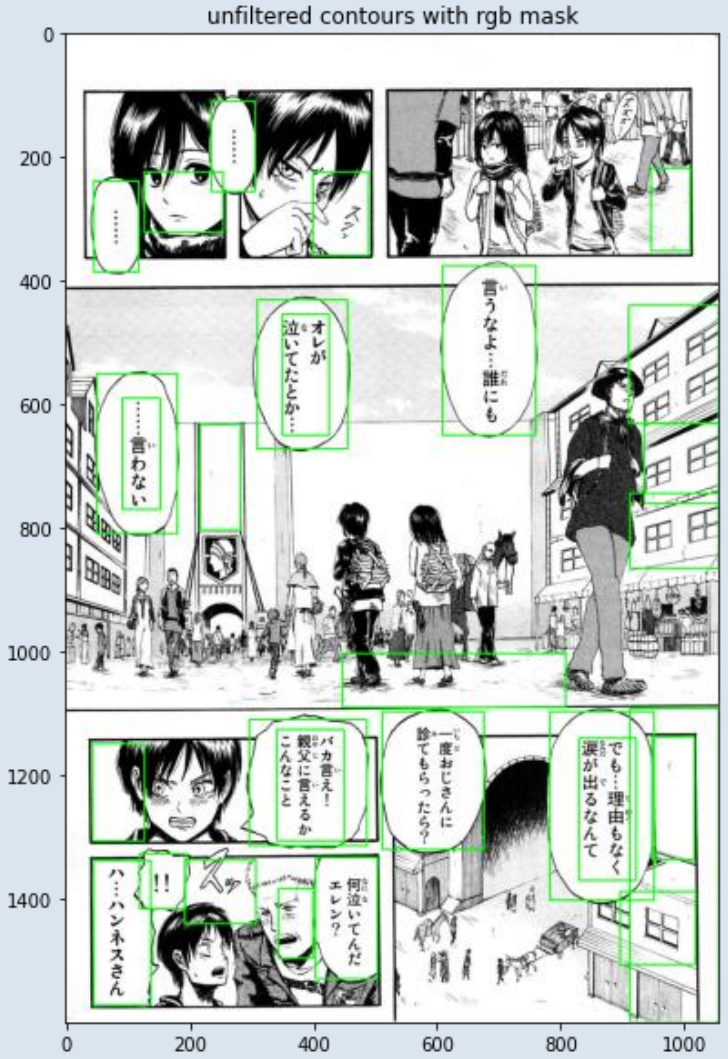
-RGB Mask, bubbles more apparent



Part 1: Image Segmentation

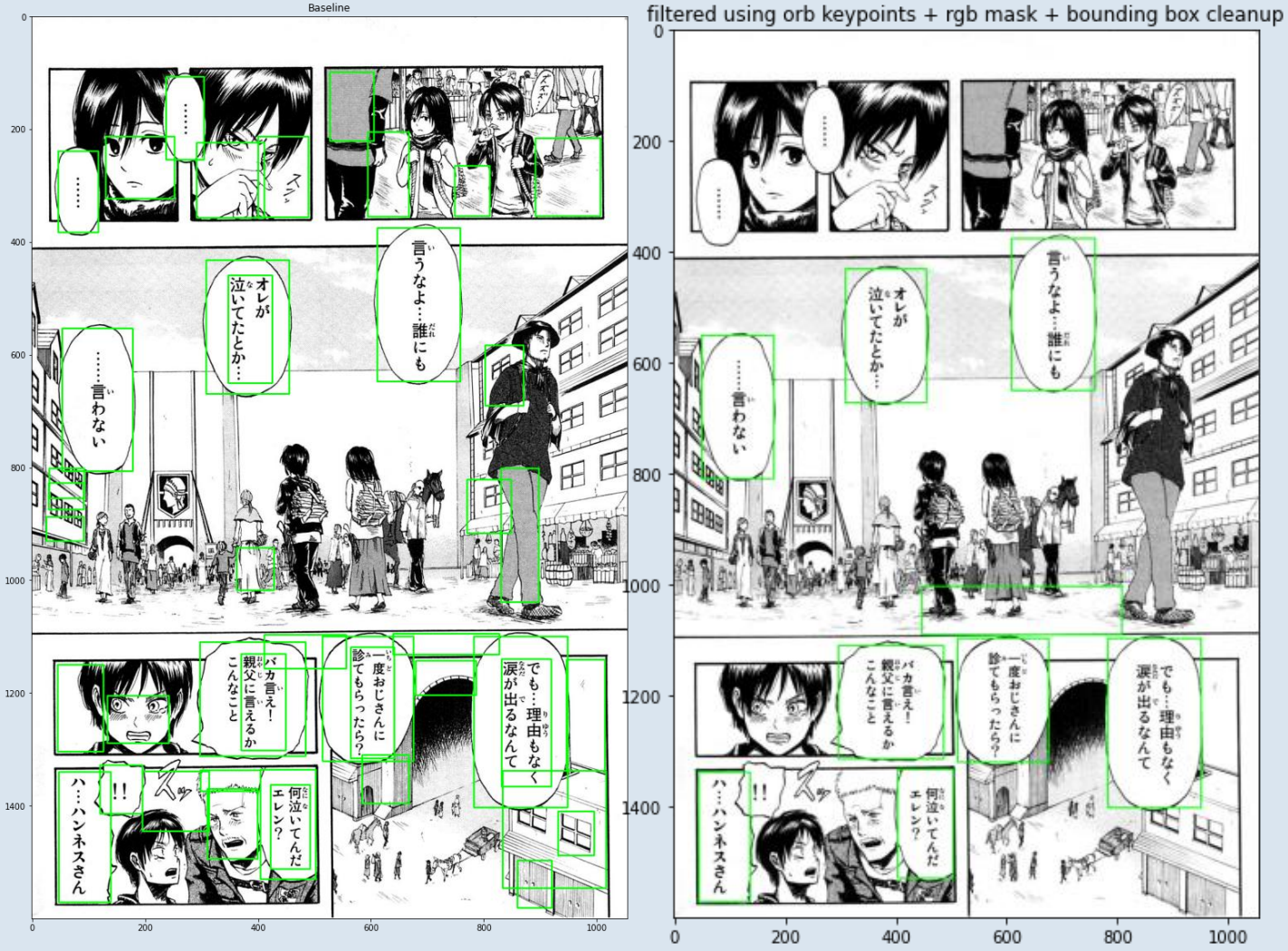
Comparison:
-Baseline v RGB Mask





Part 1: Image Segmentation

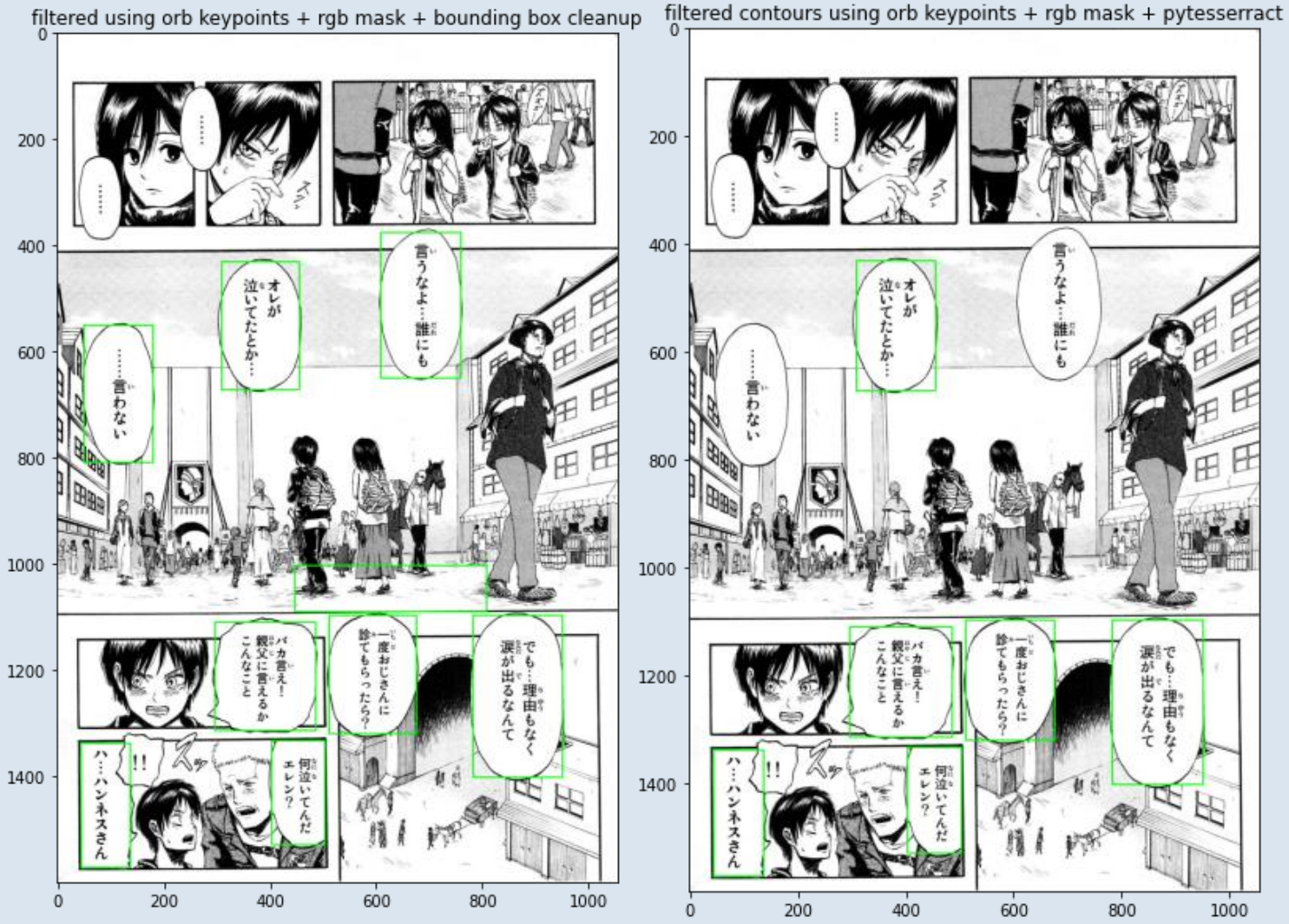
Comparison:
-Baseline v RGB Mask + key points + box cleanup



Part 2: Translation

OCR: Pytesseract
Filtering

-Lost some bubbles
-Unicode detection



Part 2: Translation

ROI – Regions of Interest

OCR: Pytesseract Filtering

-Lost some bubbles
-Tested Unicode detection

OCR Recognition

```
[['人 ハ      ん'],
 ['こ ん父と なに言 こ とえ '],
 ['い レ てがたと NT /'],
 ['gg レ泣 * ン い | 当  '],
 ['て度もおらじっさきい5 ら ?'],
 ['「れなよ誰 # にいき /'],
 ['7 呈 が 出く る ? 由 # んもな ']]
```

Baseline Translation - goslate

```
People
What do you say with my father?
NT /
gg crying * n |
It ’s also the same as 5?
"Lena yo who go to # /
7 Is it presented?
```

Part 2: Translation

OCR Recognition

```
[['人 ハ      ん'],
 ['こ ん 父 と  な に 言  こ  と え  '],
 ['い レ て が た と NT /'],
 ['gg レ 泣 * ン い | 当   '],
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 ['「 れ な よ 誰 # に いき /'],
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Baseline Translation - goslate

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People
What do you say with my father?
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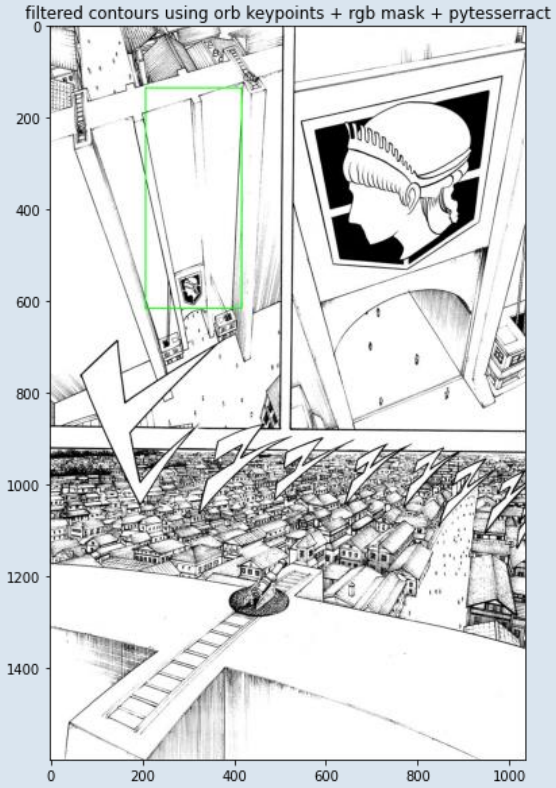
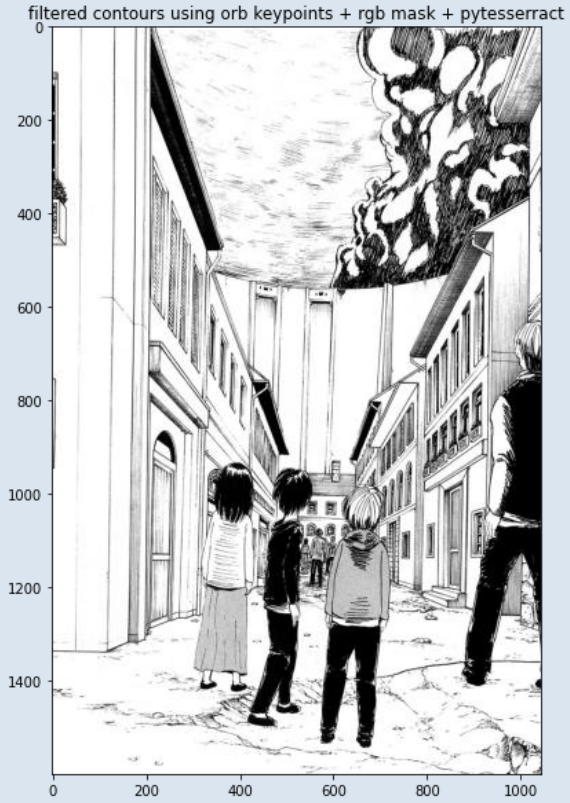
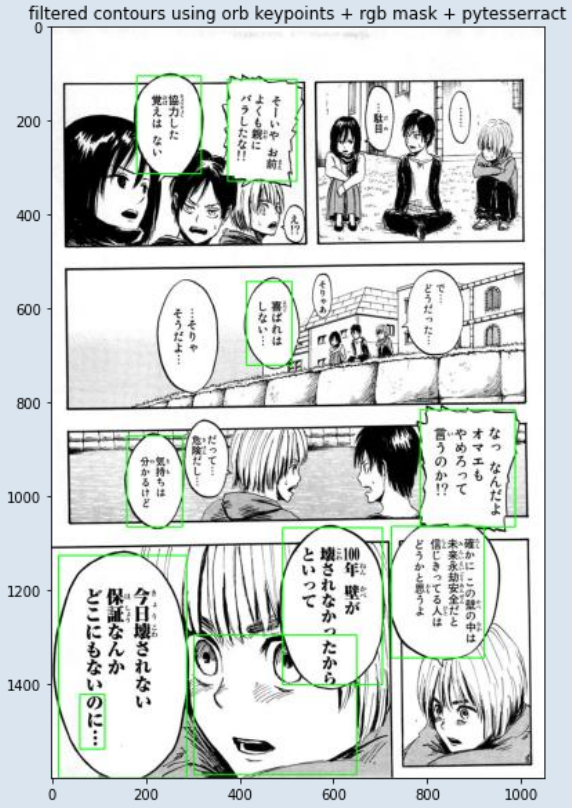
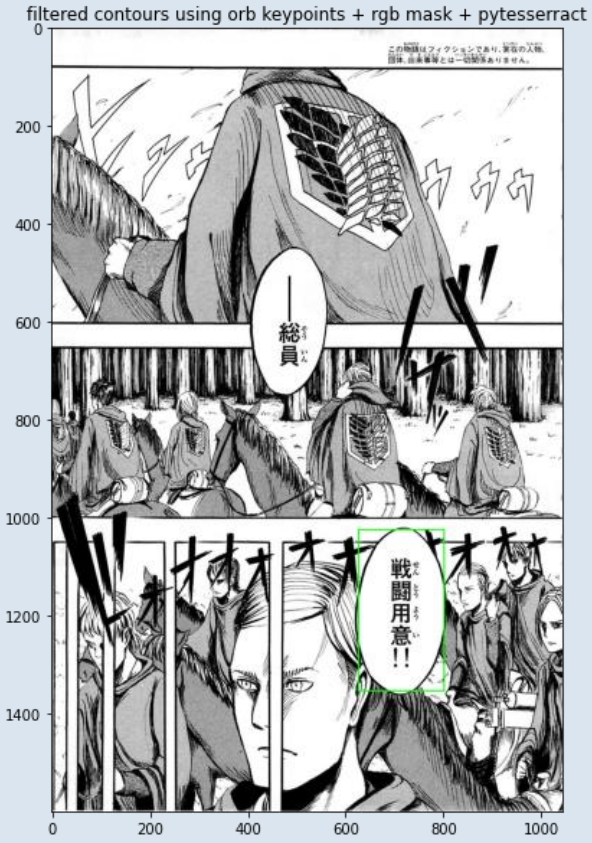
Part 2: Test Cases – Full Chapter









ROI detection: 54 pages, 2min 19 seconds

Improvements

ROI

-Regions of interest (bounding boxes) not flexible enough, could be improved by filtering with more evidence

-Use neural net to improve bubble detection

Translation

-Pytesseract OCR not very accurate in detecting Japanese text, test with other OCRs

-Do sharpening of the bounding boxes or better OCR

Test Cases

- ROI detection limitation gives false detections and missed detection

- Could be improved by better ROI + OCR as they are used con-currently in filtering

Extension – VN Translator

Visual Novel Translator

- Even more niche area, English patches take years for release.
- Fixed layout, easy segmentation, translation focused
- Windows screen overlay app for real time translation

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Thank you!