

A Mobile Scanner-OCR System

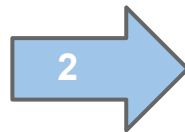
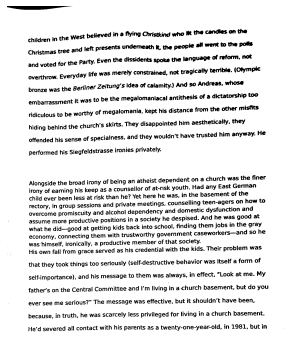
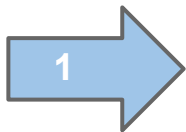
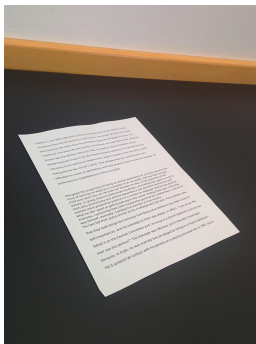
A stepping stone towards receipt-to-spreadsheet

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Approach

Desktop OCR system work very well when provided with high quality scanned document images. This inspired the following two steps approach

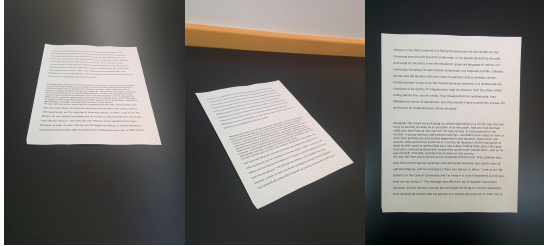
1. Build a “robust” mobile scanning pipeline
2. Feed the result to an OCR system



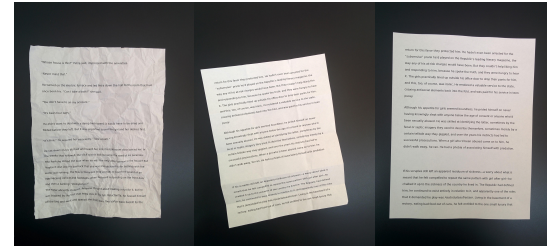
1 children in the West believed in a flying Christkind who lit the candles on the
2 Christmas tree and left presents underneath it, the people all went to the polls
3 and voted for the Party. Even the dissidents spoke the language of reform, not
4 overthrow. Everyday life was merely constrained, not tragically terrible. (Olympic
5 bronze was the Berliner Zeitung's idea of calamity.) And so Andreas, whose
6 embarrassment it was to be the megalomaniacal antithesis of a dictatorship too
7 ridiculous to be worthy of megalomania, kept his distance from the other misfits
8 hiding behind the church's skirts. They disappointed him aesthetically, they
9 offended his sense of specialness, and they wouldn't have trusted him anyway. He
10 performed his Siegfriedstrasse ironies privately.
11
12 Alongside the broad irony of being an atheist dependent on a church was the finer
13 irony of earning his keep as a counsellor of at-risk youth. Had any East German
14 child ever been less at risk than he? Yet here he was, in the basement of the
15 rectory, in group sessions and private meetings, counselling teen-agers on how to
16 overcome promiscuity and alcohol dependency and domestic dysfunction and
17 assume more productive positions in a society he despised. And he was good at
18 what he did—good at getting kids back into school, finding them jobs in the gray
19 economy, connecting them with trustworthy government caseworkers—and so he
20 was himself, ironically, a productive member of that society.
21 His own fall from grace served as his credential with the kids. Their problem was
22 that they took things too seriously (self-destructive behavior was itself a form of
23 self-importance), and his message to them was always, in effect, "Look at me. My
24 father's on the Central Committee and I'm living in a church basement, but do you
25 ever see me serious?" The message was effective, but it shouldn't have been,
26 because, in truth, he was scarcely less privileged for living in a church basement.
27 He'd severed all contact with his parents as a twenty-one-year-old, in 1981, but in
28
29

Challenges

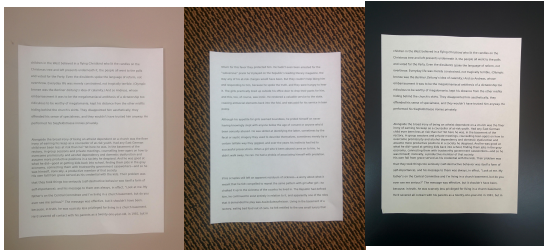
Camera orientation



Document quality



Background color



Evaluation Procedure

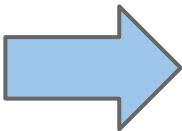
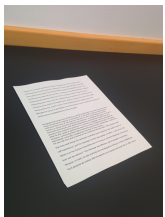
Dataset

11 pages of a short story [1]. 3 camera angles (front,side,top). 3 background types (bright,dark,noisy). 3 document qualities (regular, folded, crinkled).

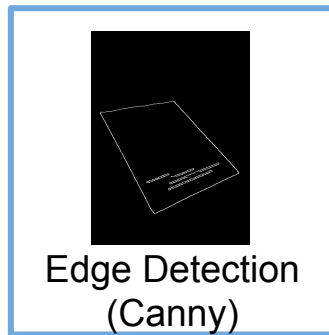
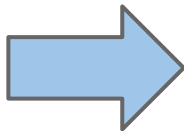
Metric

Average cosine distance between output of OCR on mobile scanned image and original text.

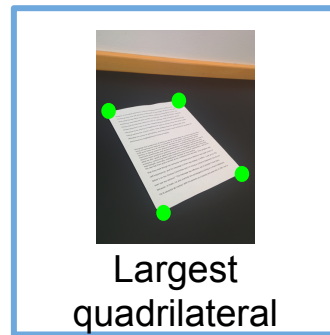
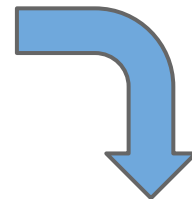
Mobile Scanner Algorithm



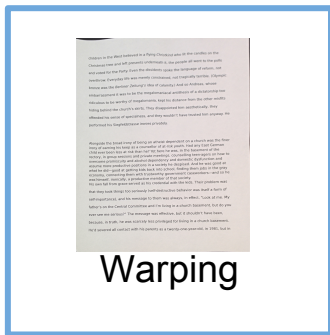
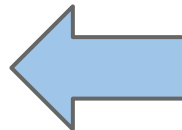
Gaussian Blur
and Sharpening



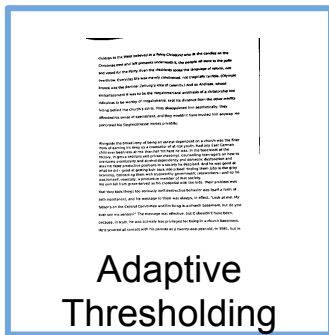
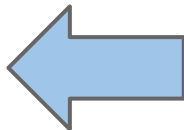
Edge Detection
(Canny)



Largest
quadrilateral



Warping

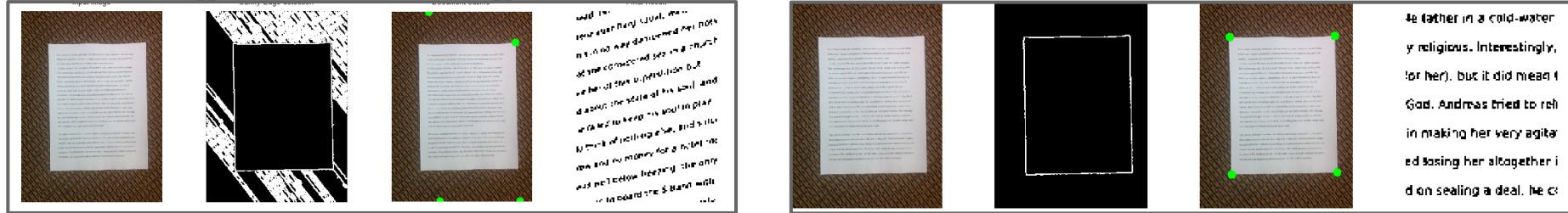


Adaptive
Thresholding

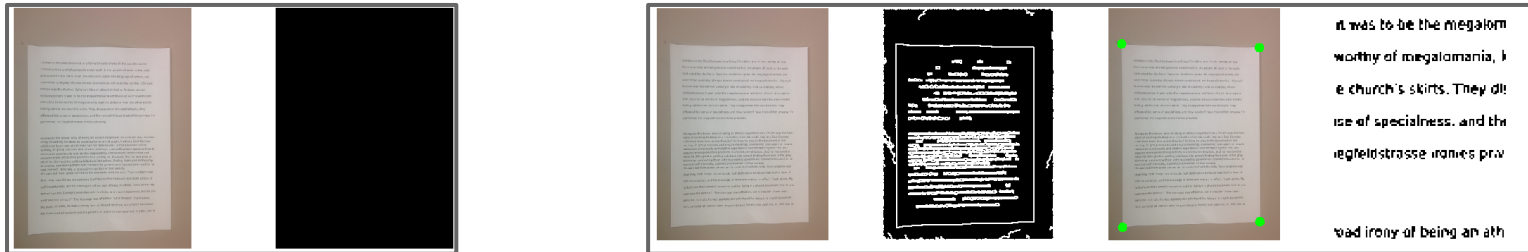
Mobile Scanner Robustness

Two parameters determine robustness.

Size of gaussian blur. Impacts robustness against noisy background for edge detection



Sharpening. Necessary when background is bright.



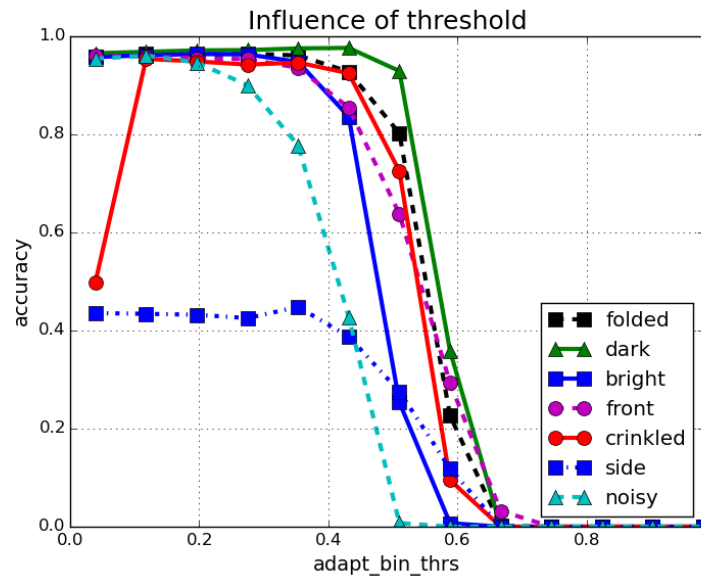
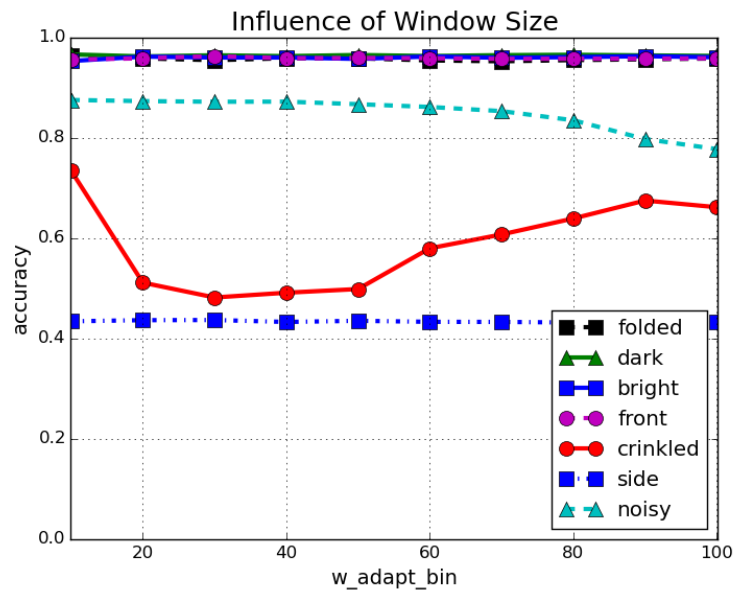
OCR Quality

Two parameters determine the quality of the OCR result

Window size in adaptive thresholding

Threshold in adaptive thresholding (when average brightness is below the threshold. the whole region is assumed to be white).

Results



Conclusion & Future

System is robust against background types

Pictures should be taken from above for better quality

System is robust against document quality

Future work:

1. Implement specific text processing algorithm to convert receipt into a spreadsheet
2. Migrate code to mobile phone.