Code Runner: Solution for Recognition and Execution of Handwritten Code

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Motivation
In technical interviews, interviewees are sometimes asked to write code on white board or paper. Interviewer can see the general logic of the code but cannot actually run it and prove its correctness. Therefore, the goal of my project is to provide a solution that would allow people take a picture of a piece of code by android phone and get its output. For now the target code is python. More programming languages will be included if time allows.

Implementation details
The entire project would follow the client-server model. Therefore, the server side can do more complex computation and involve more programming language. Here is the detail of workflow:

1. Client (Android Phone) takes a picture and sends it to server
2. Preprocessing the image
   In this step, size normalization is first conducted on image. Then I would denoise the image use median filter and remove the small regions, which should be dust or noise. After that, the image is binarized using Otsu Method.
3. Recognize the code
   I would use Tesseract-OCR engine in this Part. Tesseract is originally designed for printed text recognition, but after proper training, it can also be used for handwritten text recognition. Some datasets have already been collected for training purpose.
4. Post-processing the result
   Since there should be some common key words for a certain programming language e.g. ‘def’ in Python, I would build a dictionary contains such key words and run the spell corrector on each recognized term. The general idea is that I would search for all
candidate words that are within the certain edit distance from the given word and see whether any candidates match words in dictionary. [5]

5. The result is then sent back to the client. Client can now manually check whether there is still any mis-recognition. After that the client can compile the final-version code and produce the output. For this part, I haven’t decided whether let server or client to do the compilation. The decision would be made when we come to this step.

References:
[4] IAM Handwriting Database
   Sam Roweis’ Dataset
   UJI Pen Characters Data Set