

Physical Key Identification with Android
EE 368 Spring 2012

Eric Lam (ericflam@stanford.edu) and Chongxuan Tang (kthytang@stanford.edu)

1. Introduction

Most people have more than one key on their keychain. People in certain occupations may even have more than 10 keys on their keychain. For humans, it is very difficult to distinguish different keys apart since they all have the general shape and the differences between them are very subtle. However, using image-processing techniques such as shape recognition, we can train a computer to recognize and correlate distinct keys with their corresponding locks at a much higher rate of accuracy and precision relative to humans. In addition, the number of key lock pairs we can train a program to recognize and recall is much higher than what an average human can do. We aim to create an android application that will be able to remember and recognize keys and the locks that the keys open. That way, a user can easily identify the appropriate key. This technology can help those in real estate, custodial services, and office managers to stay organized more easily.

2. Project Plan

We'll start by first implementing key recognition in controlled environments with a single key type. Keys will be horizontally placed on a white background and identified using the unique peaks and values on the key edge [1]. We plan on using the techniques described in [2] and [3] to be able to extend our application to different viewing angles, backgrounds and keys. Also, we hope to be able to distinguish and identify multiple keys in the same frame. Once we are able identify keys robustly, we will potentially use real time video to highlight keys and label the places or doors the keys open. Some potential feature detection methods include SIFT and SURF. We will choose different methods depending on the robustness and computation time. Implementation on video will heavily depend on the efficiency and robustness of the algorithms used.

3. References

- [1] B. Laxton, K. Wang, and S. Savage. Reconsidering Physical Key Secrecy: Teleduplication via Optical Decoding. ACM CCS 2008, Alexandria, VA, October 2008.
- [2] S. Belongie, J. Malik, and J. Puzicha. Matching Shapes. In *Proceedings of the Eighth Internet Conference on Computer Vision (ICCV)*, July 2001.
- [3] R. Hartley and A. Zisserman. *Multiple View Geometry in Computer Vision*. Cambridge University Press, 2003.