

# Shoe Track Search based on Hierarchical Features

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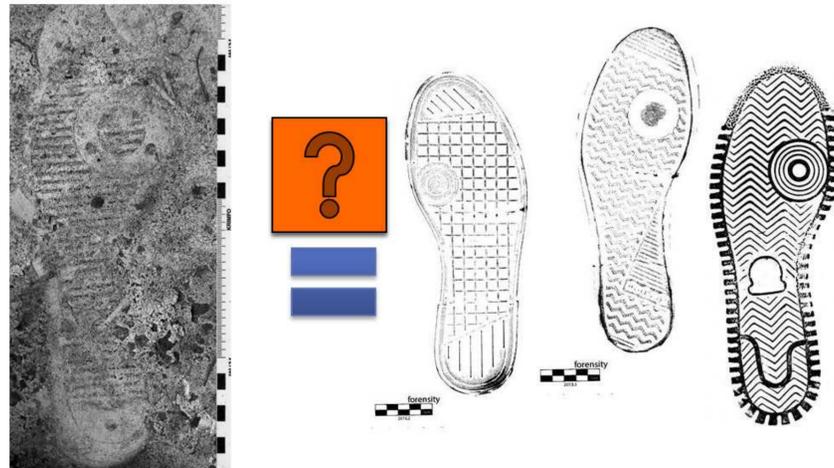
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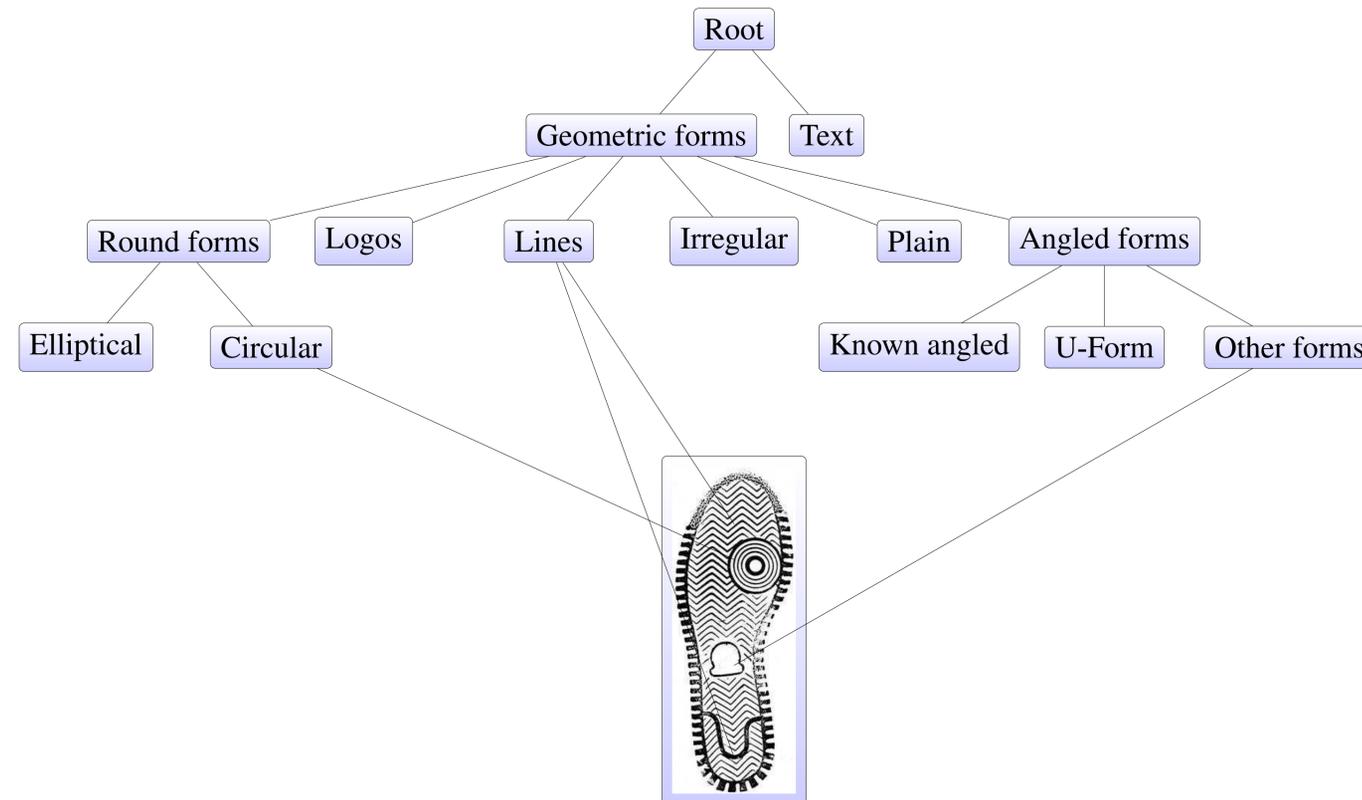
## Introduction

- Shoe tracks are important evidences on crime scenes
  - give important clues to identify the culprit
  - allow for drawing connections between crime scenes
- Tedious work to manually compare all shoe prints with each others
  - large number of available shoe print pictures
  - pictures of shoe prints from other cantons may not be directly available and have to be requested first
- One way of facilitating search: map shoe prints to their associated shoe models and check whether several shoe prints originate from the same shoe model



## Our approach

- A set of attributed features is defined that accounts for striking shoe characteristics
- Features are hierarchically organized in a taxonomy



- Hierarchical structure allows for obtaining shoe track matches in case of incomplete information more easily
- All shoe prints and shoe models are described by these features
- Forensic expert manually enters features and associated attributes for a shoe print image to obtain best matching shoe model from database
- System is planned to give feedback for best user action to improve search results

### Potential search methods for shoe model retrieval (still work in progress)

- Tree edit distance [1]
  - Convolution kernel based on weighted common subtree counts
  - Similarity measure, not distance measure like edit distance
- Multiset based tree comparison [3] - shallow approach that is very efficient

### Acknowledgments

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### References

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- [2] Culotta, A., Sorenson, J.: Dependency tree kernels for relation extraction. In: *Proceedings of the 42nd Annual Meeting of the Association for Computational Linguistics, Dependency Tree Kernels for Relation Extraction* (2004)
- [3] Cohen, S., Or, N.: A general algorithm for subtree similarity search. In: *Proceedings of the 30th IEEE International Conference on Data Engineering, Chicago, Illinois* (2014)