Research Paper Outline

1. ABSTRACT
   1. Purpose
      1. comparison of popular techniques used for OCR classification and feature extraction
      2. experiments with different combinations of feature extraction techniques
   2. Brief summary of conclusions/results drawn from experimental results
   3. Description of topic covered
      1. OCR is a well-studied field with numerous methods implemented
      2. OCR techniques can be combined to form new systems
2. INTRODUCTION
   1. Reasoning/Defense of work completed
      1. Not much research has been done to compare the results of different combinations of OCR methods implemented in a single system.
      2. Most experiments focus on a single step of OCR, such as segmentation.
      3. This experiment compares the implementations of multiple steps in the OCR process
      4. Comprehensive analysis of popular successful OCR techniques, which attempts to find an optimal combination.
      5. Provides a way to visualize the success of the most popular techniques in a working OCR system.
      6. This experiment attempts to find a definitive answer as to which method works best, while pointing out methods that are “too powerful” for simple tasks (such as printed recognition).
      7. Compares results in an enterprise-type system, where font sizes and layouts will not be controlled.
   2. Experimental Design
      1. Implementation of different combinations of feature extraction, segmentation, and classification in a single application.
      2. Complete OCR system that integrates all steps in one, to provide a better picture of how the different methods play out in an enterprise application.
3. METHODS
   1. Style: Give a general description/definition of each method used, as well as the specific implementation of the methods in the application (during experimentation).
   2. Segmentation
      1. X/Y cut algorithm
      2. Skeleton-based segmentation algorithm (I think)
   3. Feature Extraction
      1. Chain codes
      2. Feature points
      3. Zernike moments
      4. Zoning features
      5. Profiling features
      6. Hu moments
      7. Crossings
      8. Skeleton vectors
      9. Height-to-Width ratio
      10. Horizontal/Vertical symmetry
      11. Zones
      12. Straight pixel values
   4. Classification
      1. MLP NN w/ back-propagation
      2. Euclidean distance
      3. Decision trees w/ MLP
   5. Post-processing
      1. Common OCR mistake removal
      2. Spell checking
4. RESULTS
   1. Summarize the methodology used to obtain the experimental results
      1. Brief description of the application, including how techniques were combined.
      2. Describe results, noting the more important or interesting outcomes.
      3. Indicate how results were obtained (formula to calculate recognition rate, etc.)
      4. Charts demonstrating experimental recognition with tested approaches
5. DISCUSSION
   1. Describe interpretation of results
      1. Compare the results achieved during experimentation with results achieved by other projects.
   2. Explain why more difficult algorithms (such as Zernike moments and chain codes) may not have performed to expectations.
   3. Discuss the idea that simple algorithms (such as straight pixel values) can be combined with more advanced algorithms to produce results that are satisfactory while still maintaining time efficiency and minimum complexity.
   4. Introduce the idea that highly complex algorithms do not yield much better results on texts that are easy to recognize (such as printed English). Explain why this might be so.
   5. Document the best performing combination and indicate the possible reason(s) that particular combination outperformed the rest.
   6. Address remaining questions
      1. How to optimize speed of training and/or classification
      2. How to apply current “best” methods to more complicated problems