James Watt Institute *for* High Value Manufacturing

Texture Browsing Environments

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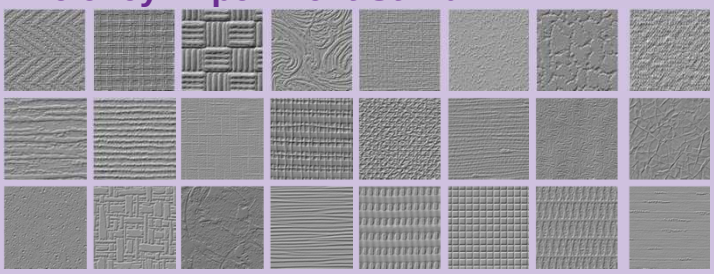
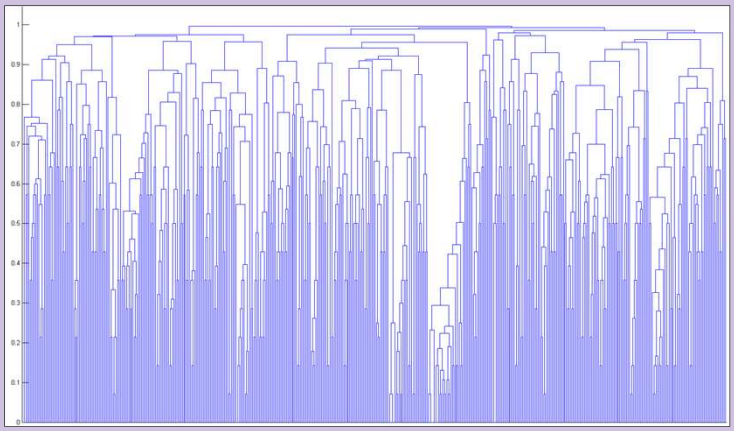
Abstract

Browsing Environments offer an alternative to search-by-query and can address difficulties with finding/creating good quality query images and the problem of repetitive queries becoming trapped among a small number of undesirable images. We propose three novel browsing environments and test their efficiency and accuracy.

Efficiency Experiment Stimuli



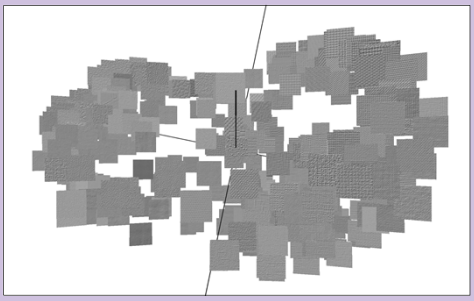
Each stimuli is a randomly selected texture from each of 24 clusters derived from a horizontal cut across the dendrogram.



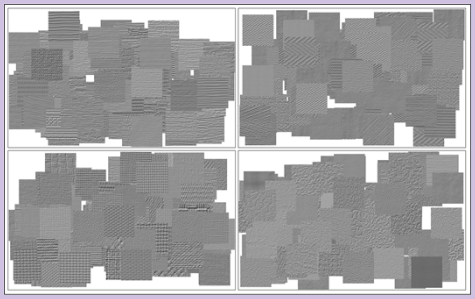
Dendrogram

The leaves of the dendrogram represent individual textures which merge with others to form clusters, finally ending with a single root node representing the whole data set. The lower the merge height, the higher agreement amongst observers that the respective textures should be grouped together.

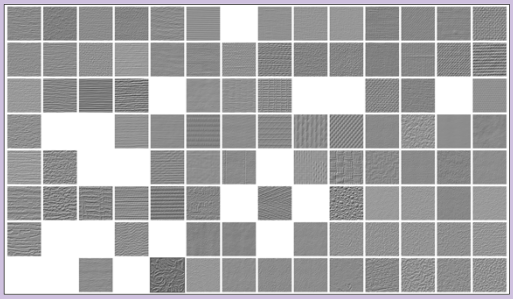
Browsing Environments



3D MDS

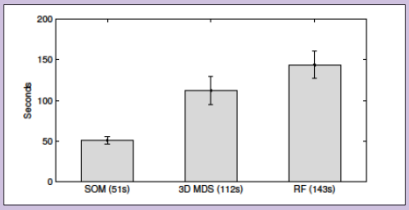


Rapid-Fire Image Preview

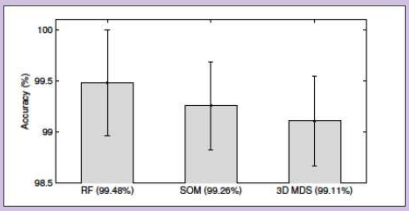


SOM Grid

Efficiency & Accuracy Results

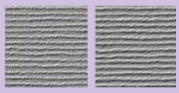


Mean Task Time

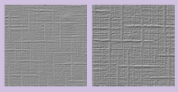


Accuracy

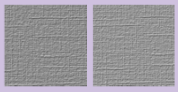
Non-Exact Selections Were Highly Similar



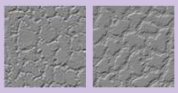
Query Selected
79% Similar
(4 Occurrences)



Query Selected
79% Similar
(2 Occurrences)



Query Selected
71% Similar
(1 Occurrence)



Query Selected
50% Similar
(1 Occurrence)

Only 8 of the 288 trials resulted in a non-exact selection being made. Analysis shows that these selections had a high similarity value to the query.

Conclusions

- SOM was more efficient than the other environments but the others could not be ranked with statistical confidence
- Votes by observers of preferred environment correlated exactly with mean task time ranking
- There was no statistical significance in the differences in accuracy between environments

Further Work

- Is aggregation of dataset possible using browsing environments?
- How does organisation of data affect task efficiency
- Can crowd sourcing be used to bootstrap logical data organisation?