

CS 499: Senior Thesis
Automatic Material Recognition Figures

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1 Images by property.



Figure 1: **Coarse - Bumpy**

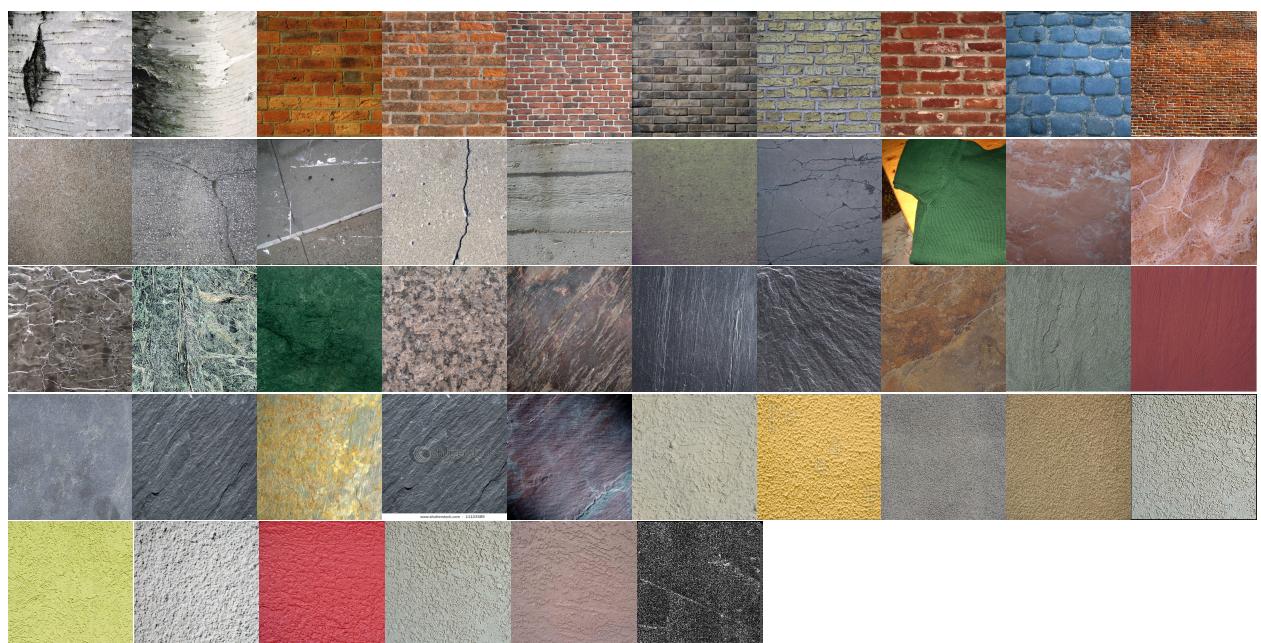
Figure 2: **Coarse - Coarse**

Figure 3: **Coarse - Extended disorganized**

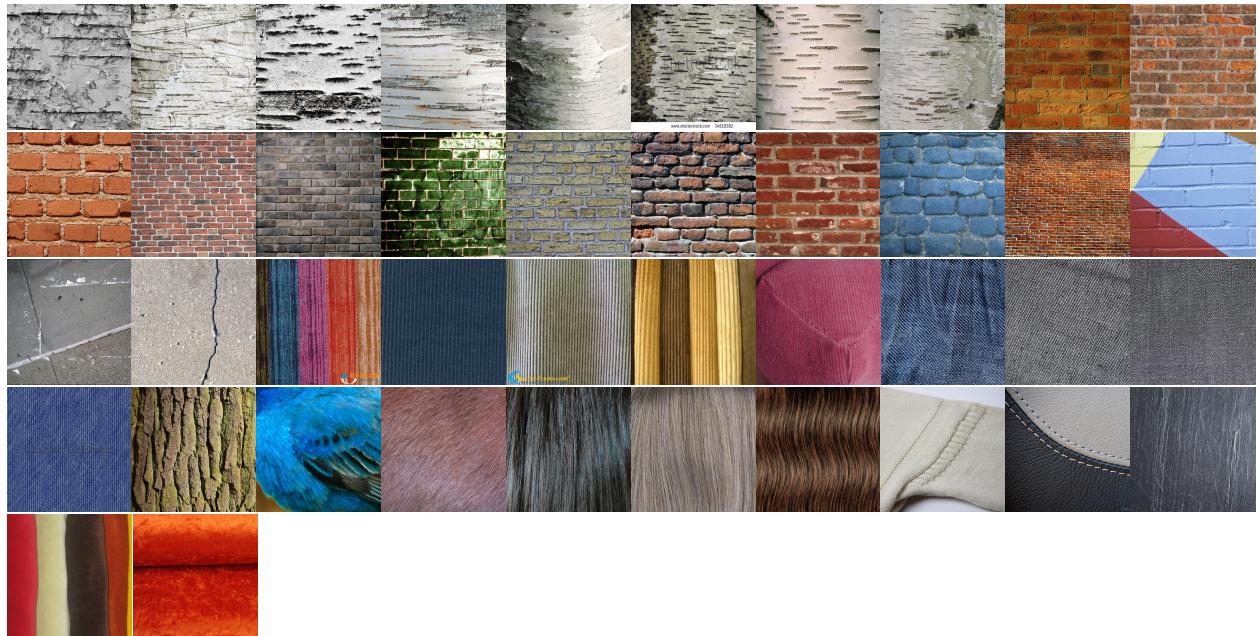


Figure 4: **Coarse - Extended organized**



Figure 5: **Coarse - Feathery**



Figure 6: **Coarse - Flat**

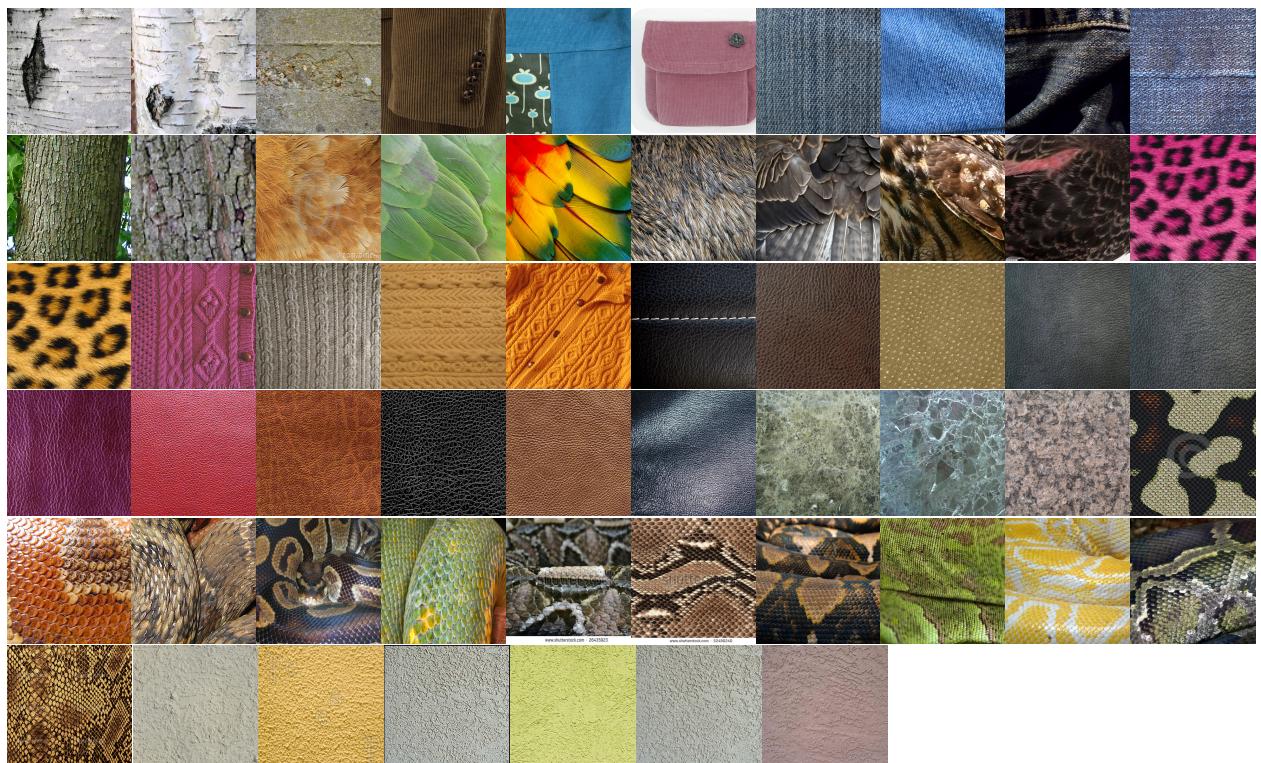
Figure 7: **Coarse - Furry**Figure 8: **Coarse - Round**Figure 9: **Coarse - Scratchy**



Figure 10: **Coarse - Smooth**

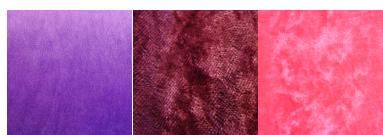


Figure 11: **Coarse - Velvety**

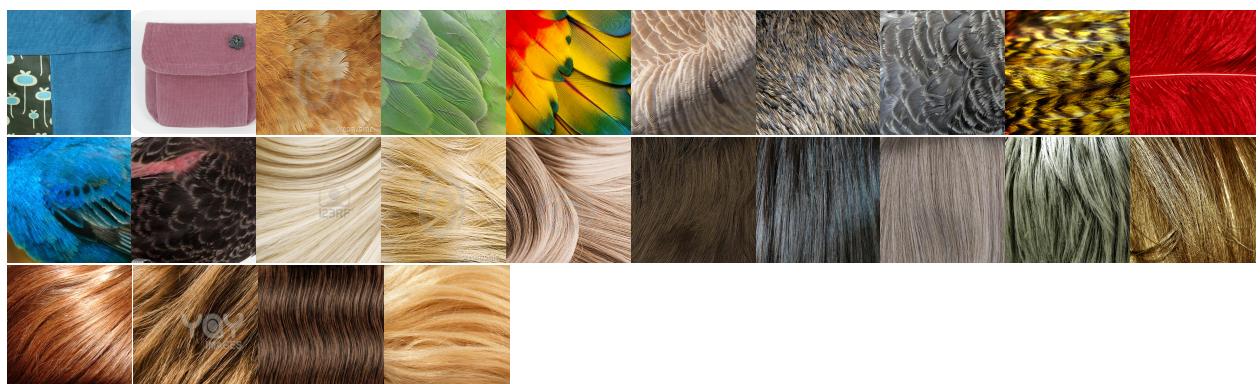
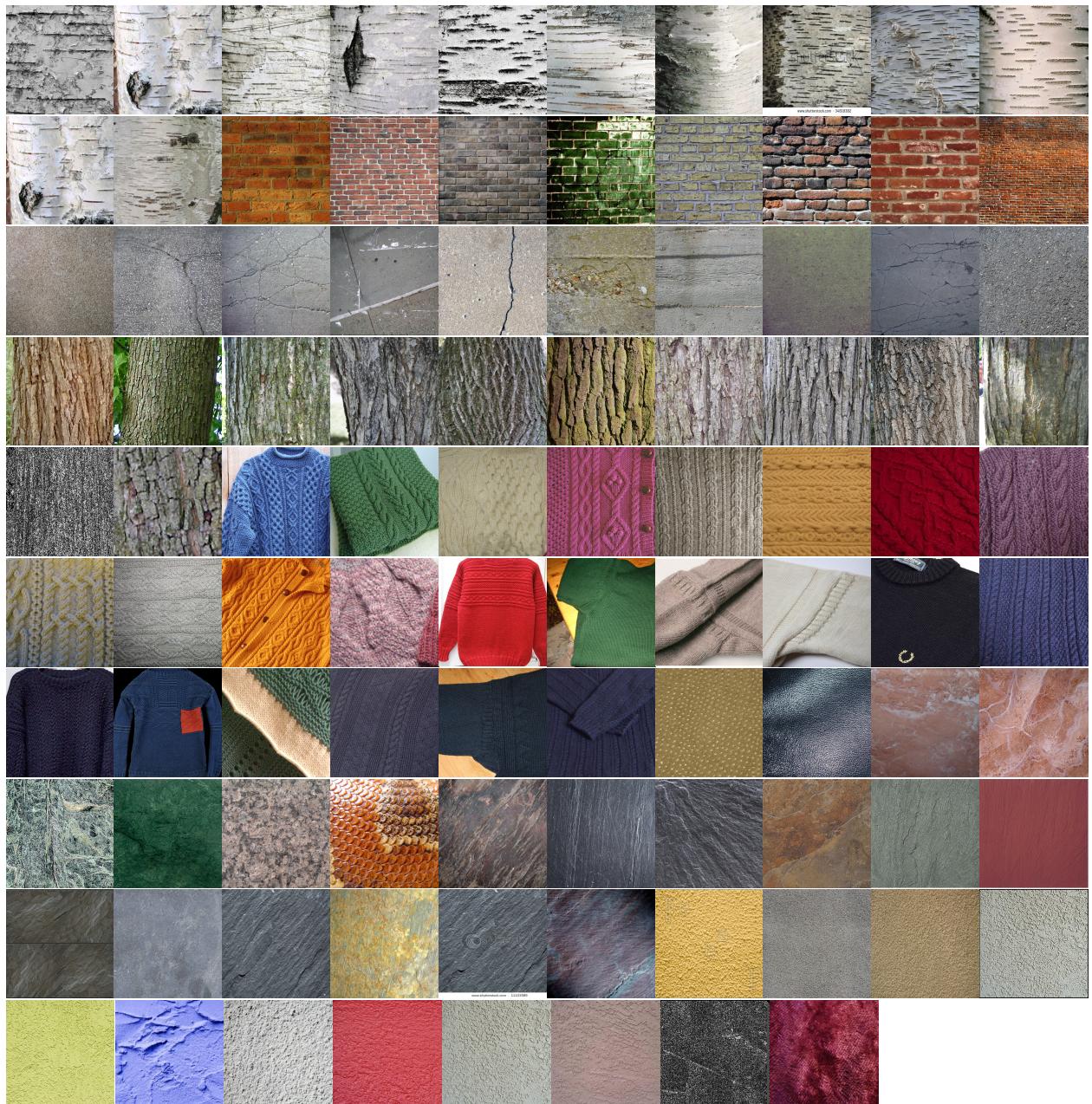


Figure 12: **Fine - Bumpy**

Figure 13: **Fine - Coarse**Figure 14: **Fine - Extended disorganized**

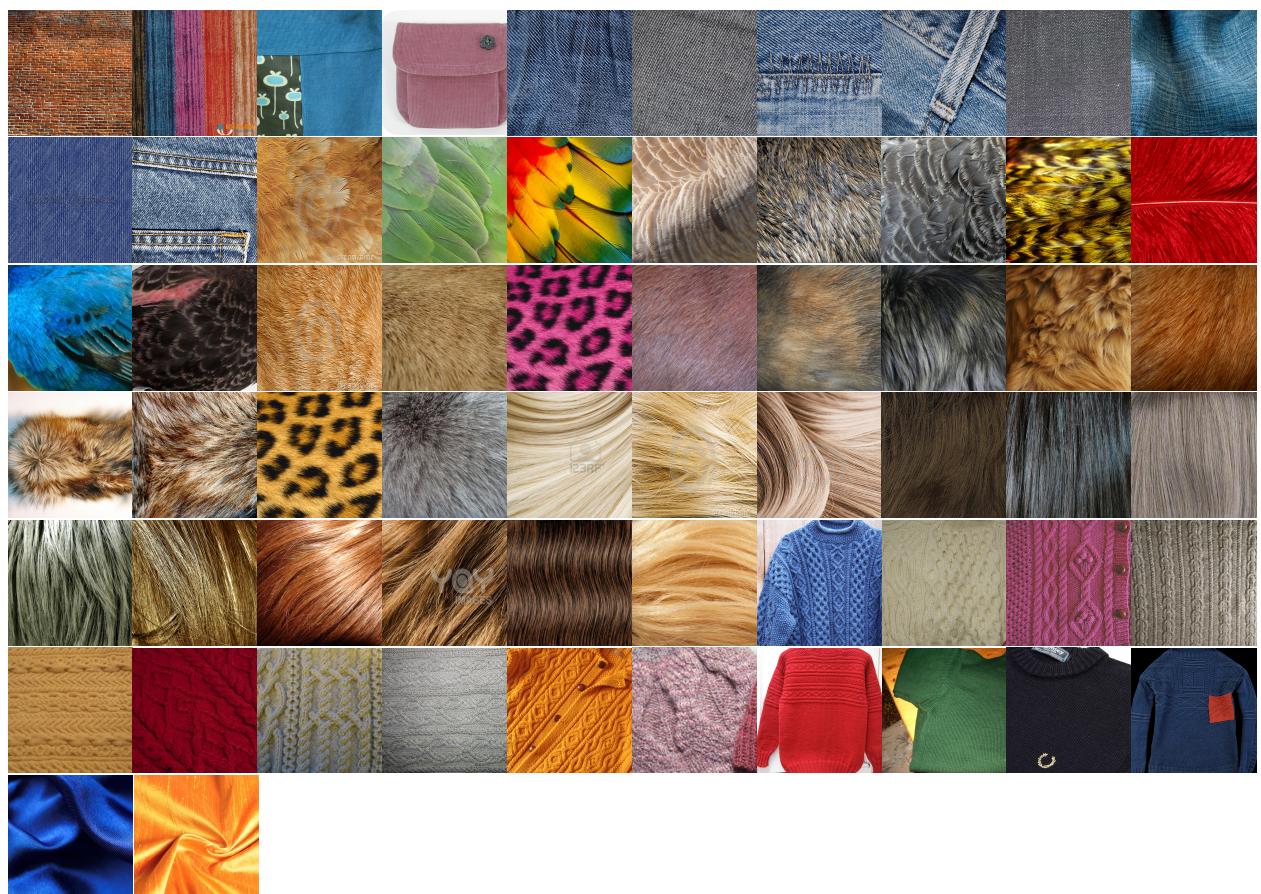


Figure 15: **Fine - Extended organized**

Figure 16: **Fine - Flat**

Figure 17: **Fine - Furry**Figure 18: **Fine - Round**Figure 19: **Fine - Scratchy**

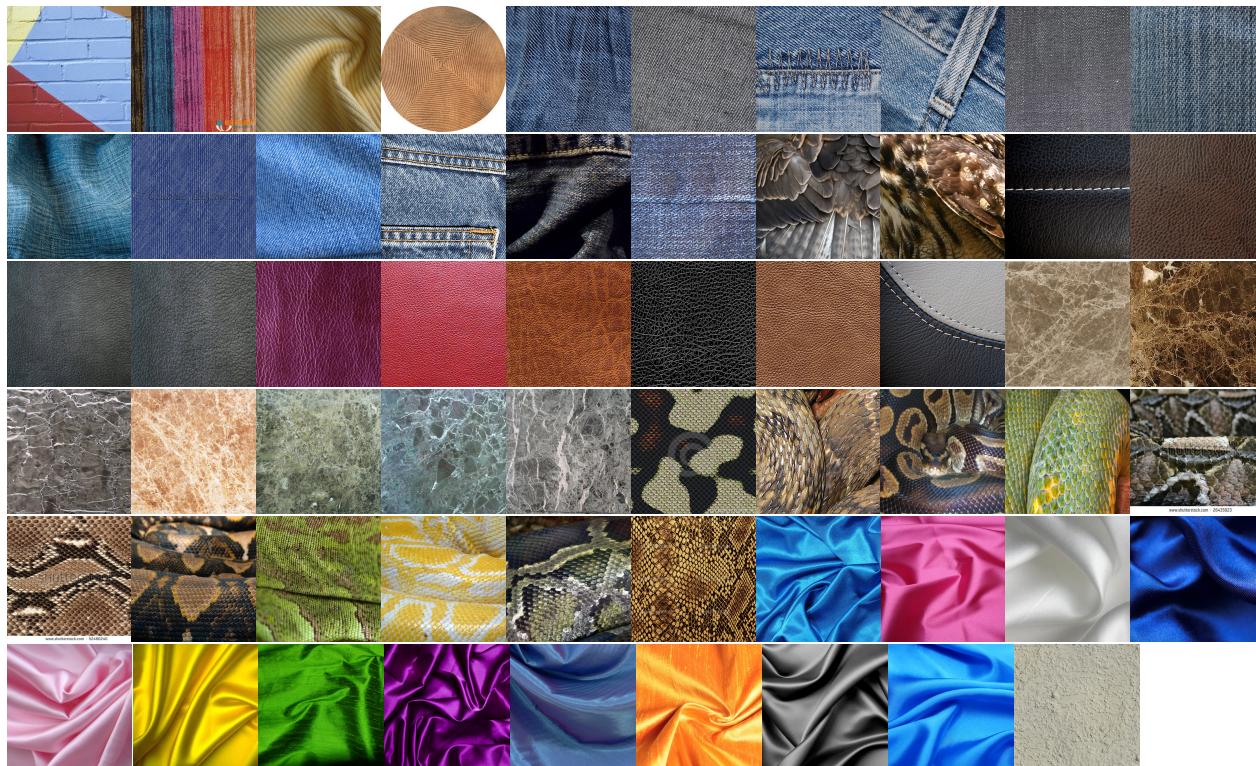
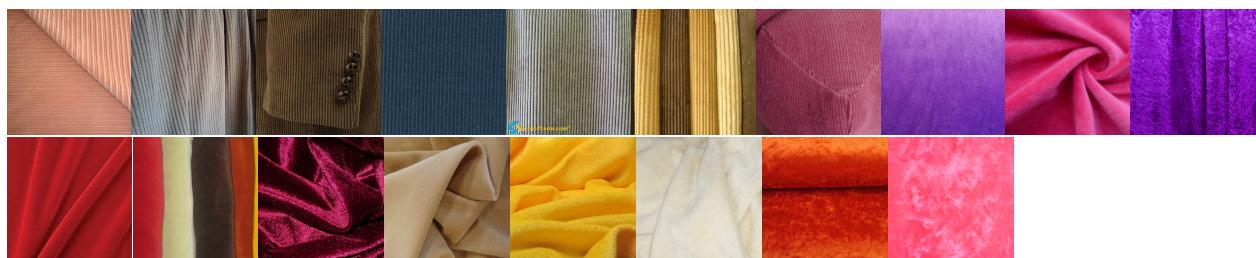
Figure 20: **Fine - Smooth**Figure 21: **Fine - Velvety**

Figure 22: **Medium - Bumpy**

Figure 23: **Medium - Coarse**



Figure 24: **Medium - Extended disorganized**

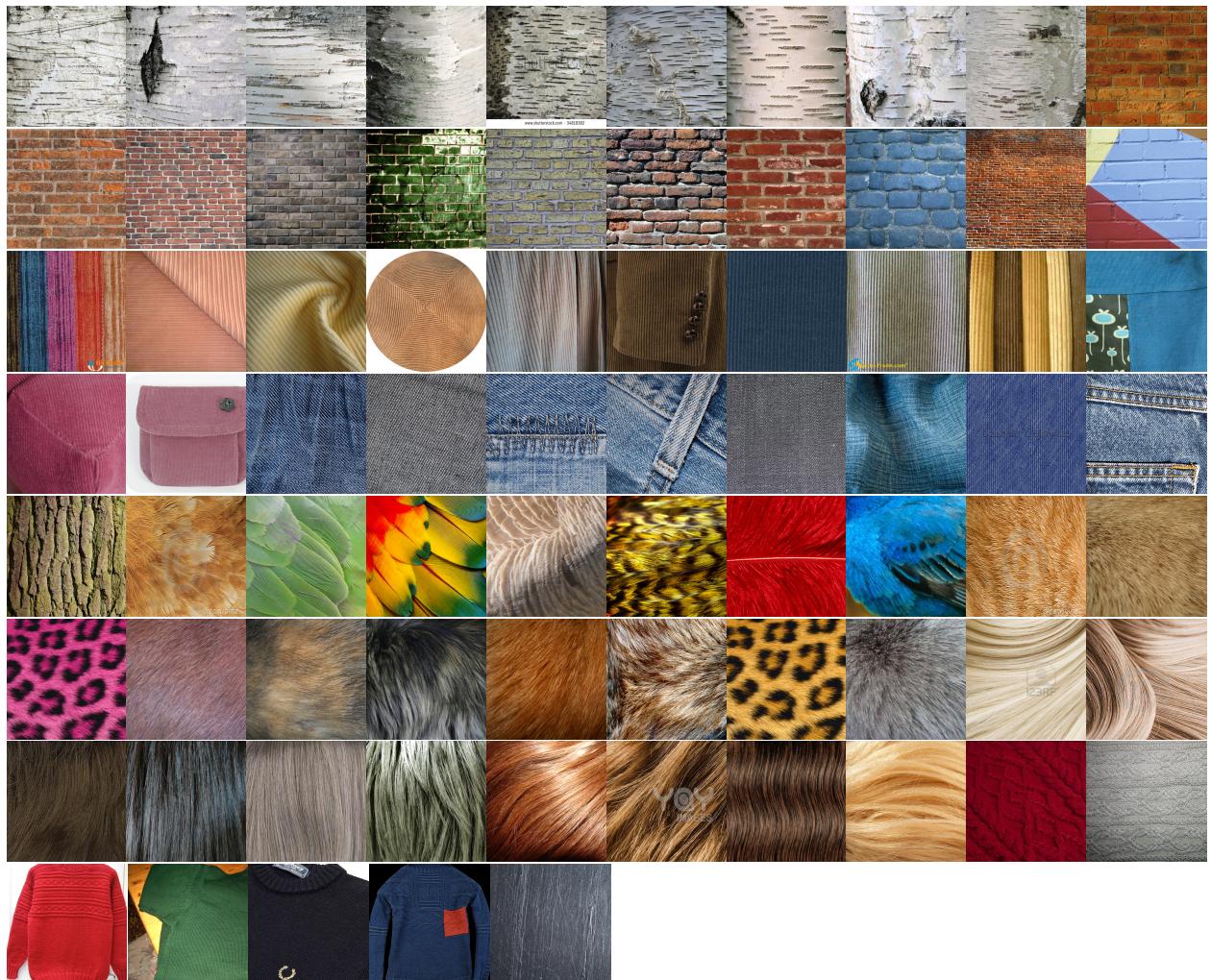
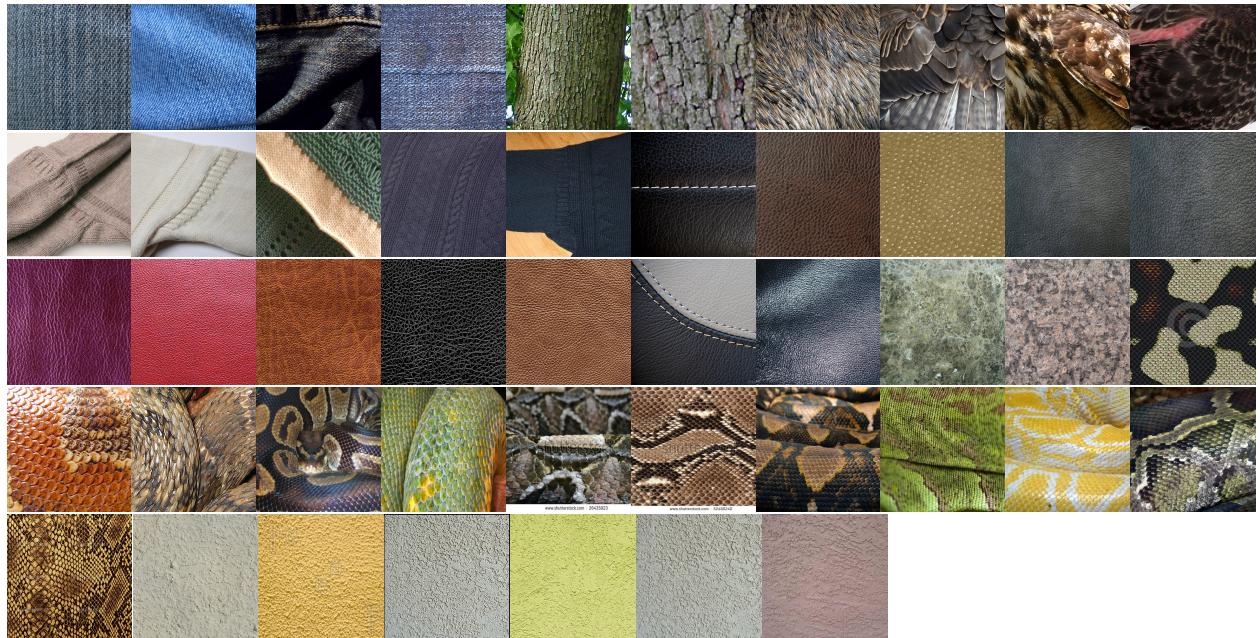


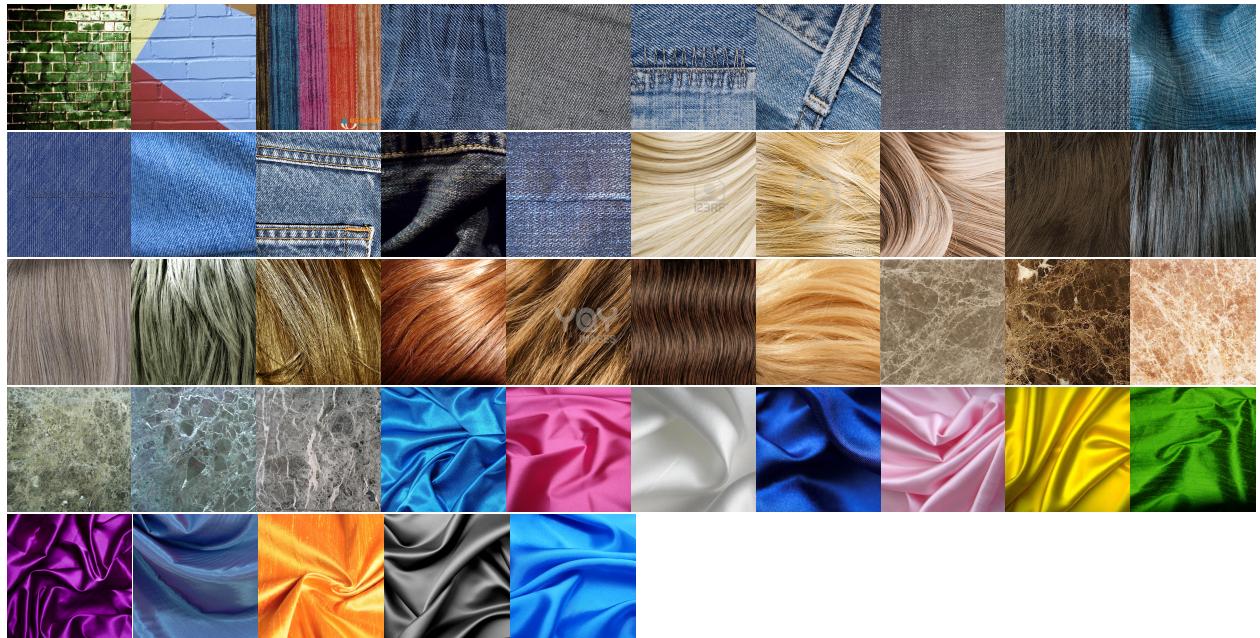
Figure 25: Medium - Extended organized



Figure 26: Medium - Feathery

Figure 27: **Medium - Flat**Figure 28: **Medium - Furry**

Figure 29: **Medium - Round**Figure 30: **Medium - Scratchy**

Figure 31: **Medium - Smooth**Figure 32: **Medium - Velvety**

2 Confusion matrices.

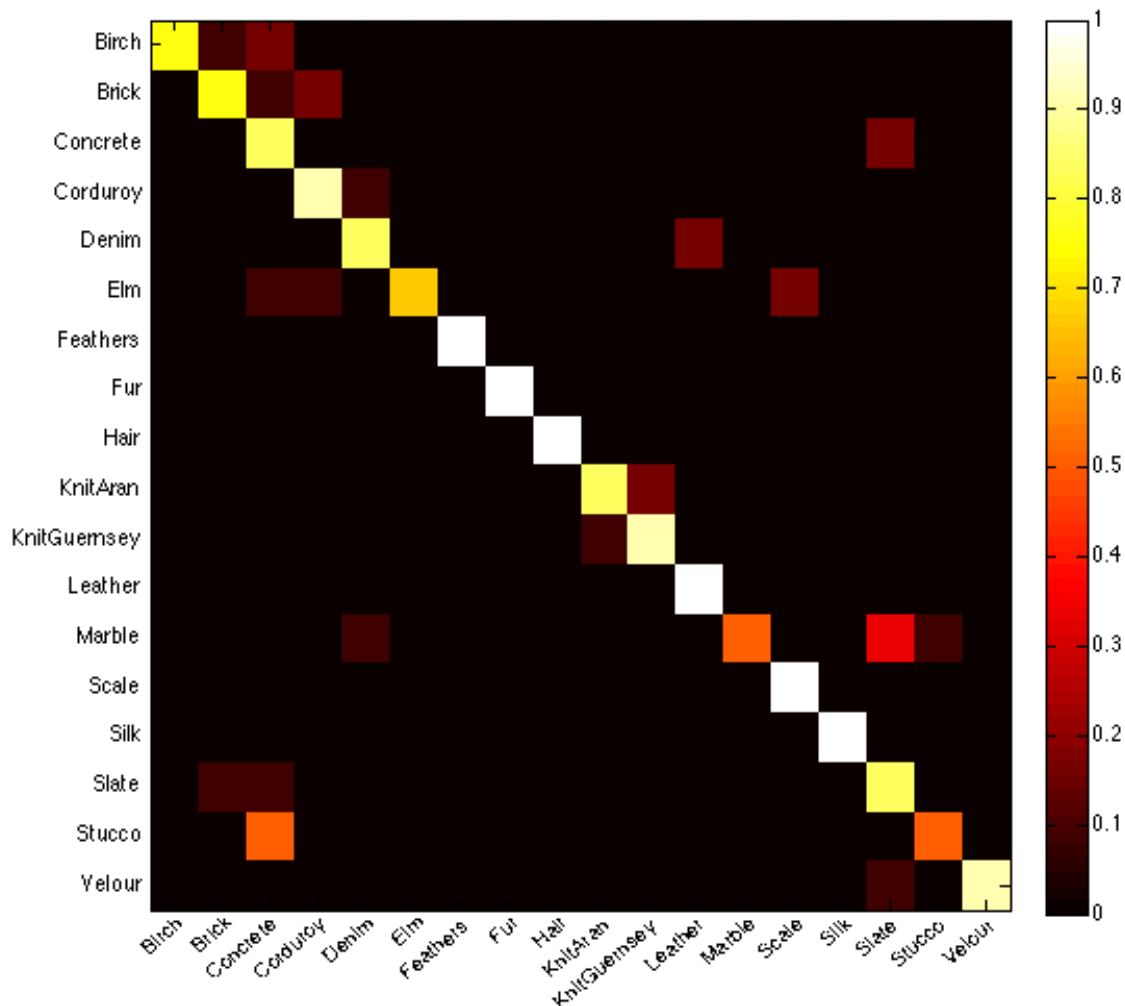


Figure 33: *Naive Bayes* confusion matrix trained with ground truth data and classifying ground truth data. Obtained using *PHOW* limited to 1000 descriptors per image, 500 *K-means* clusters and *SVM lambda* 1e-6.

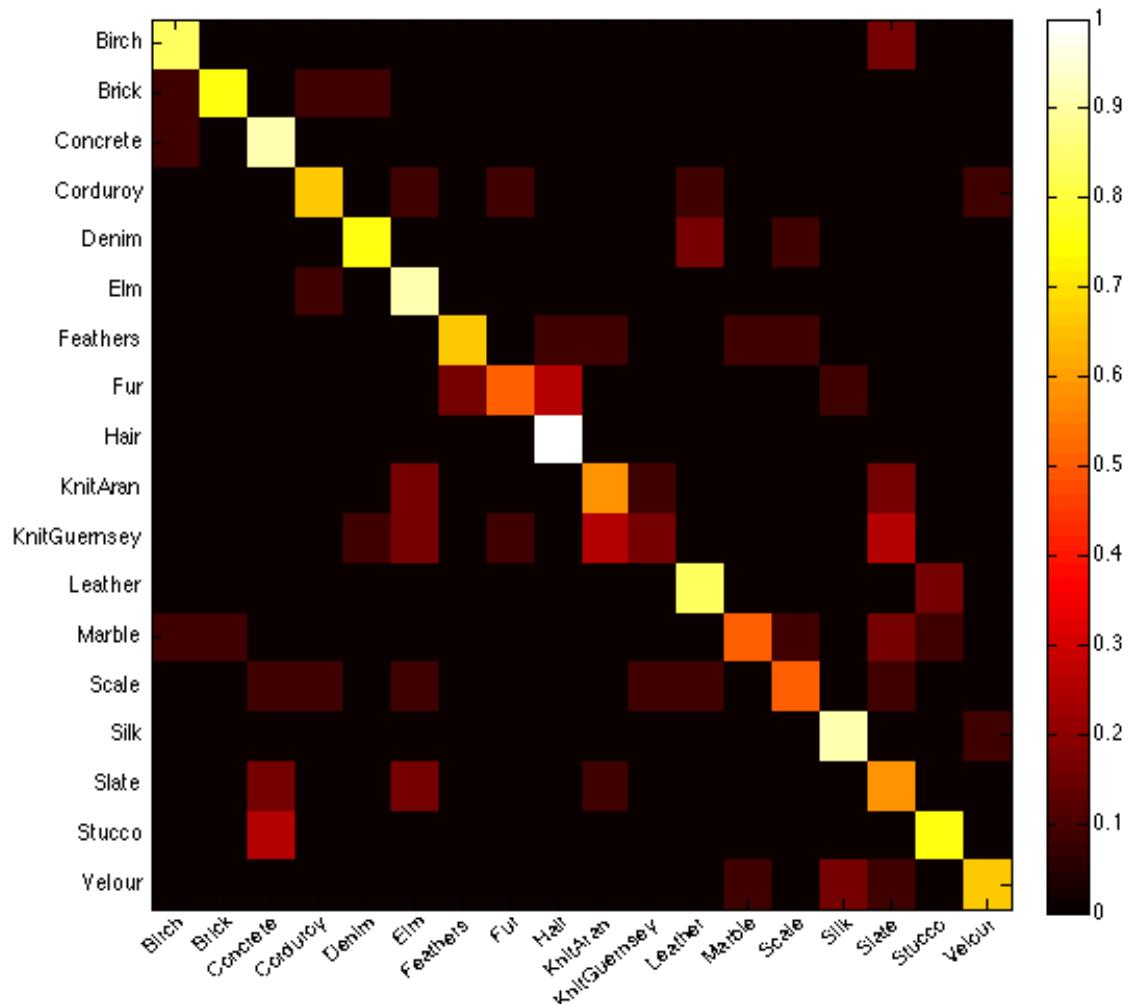


Figure 34: *Naive Bayes* confusion matrix trained with ground truth data and classifying predicted data. Obtained using *PHOW* limited to 1000 descriptors per image, 500 *K-means* clusters and *SVM lambda* 1e-6.

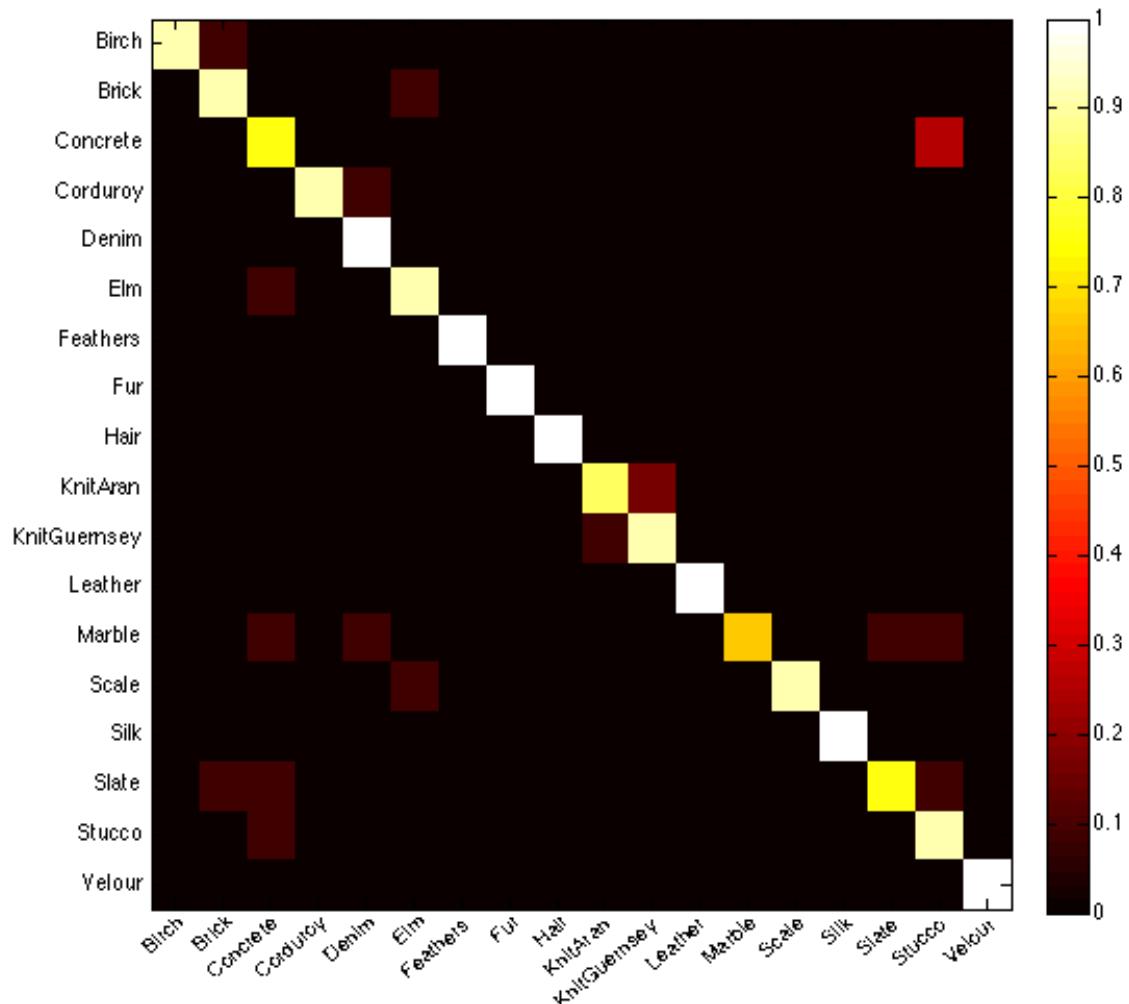


Figure 35: SVMs confusion matrix trained with ground truth data and classifying ground truth data. Obtained using PHOW limited to 1000 descriptors per image, 500 K-means clusters and SVM λ 1e-6.

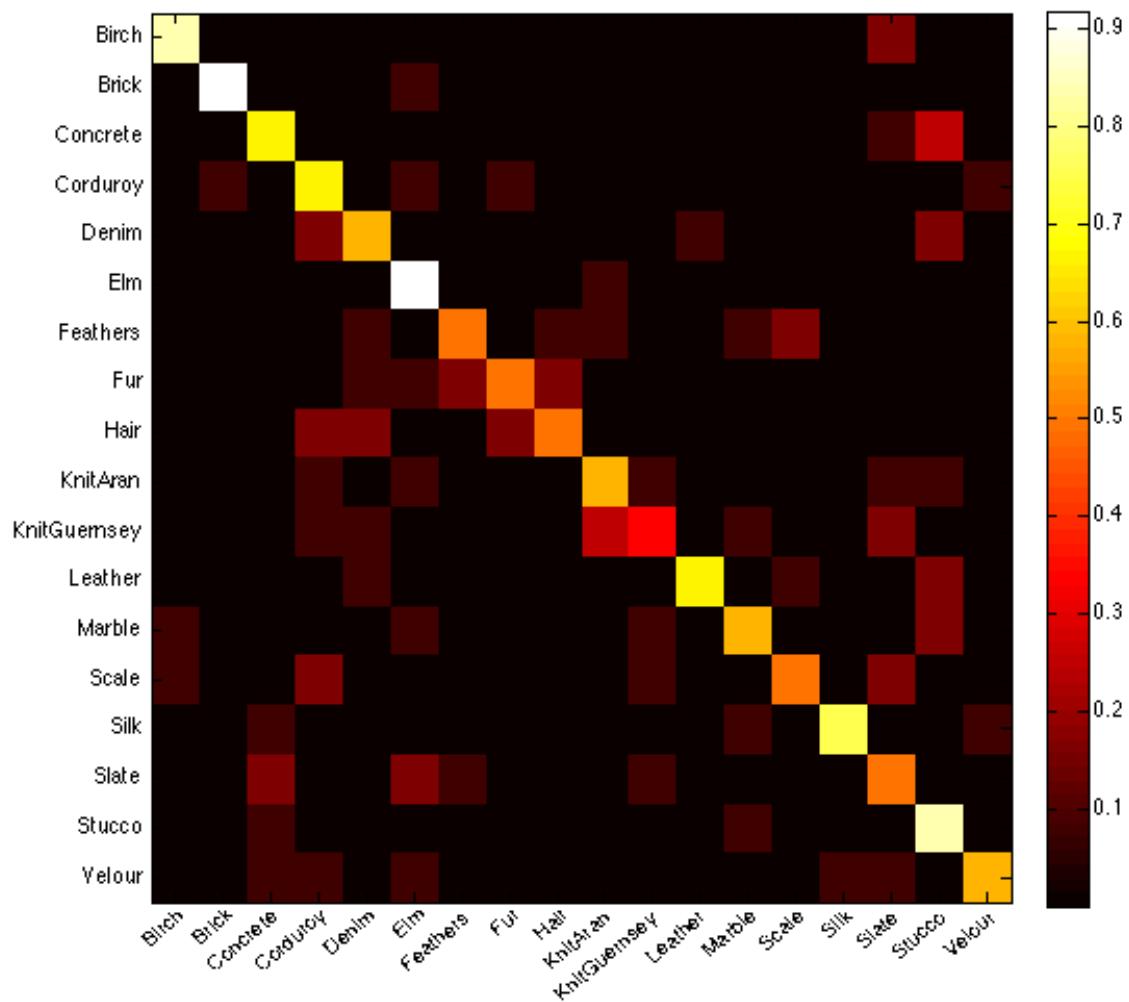


Figure 36: SVMs confusion matrix trained with ground truth data and classifying predicted data. Obtained using *PHOW* limited to 1000 descriptors per image, 500 *K-means* clusters and *SVM* $\lambda = 1e-6$.

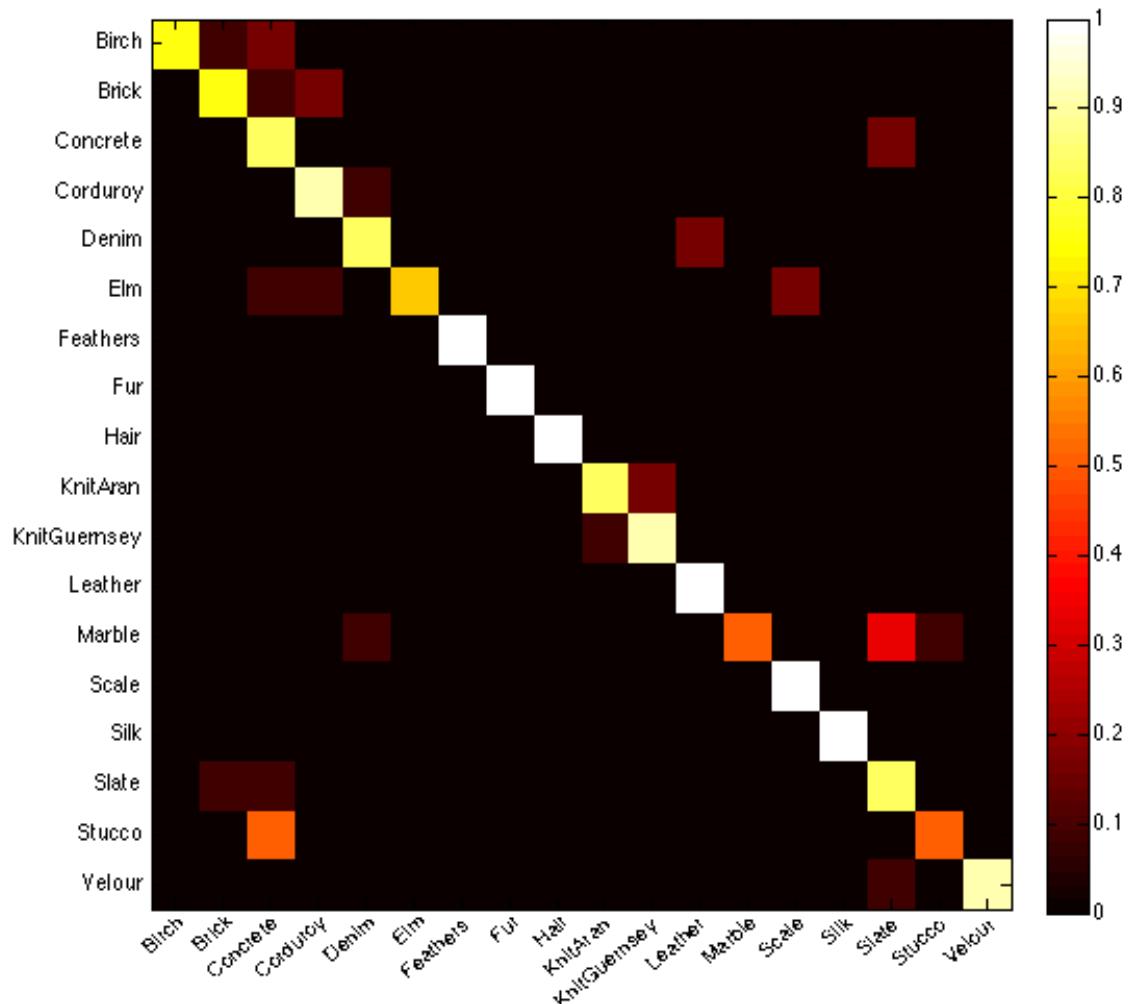


Figure 37: *Naive Bayes* confusion matrix trained with ground truth data and classifying ground truth data. Obtained using *PHOW* limited to 2000 descriptors per image, 500 *K-means* clusters and *SVM lambda* 1e-6.

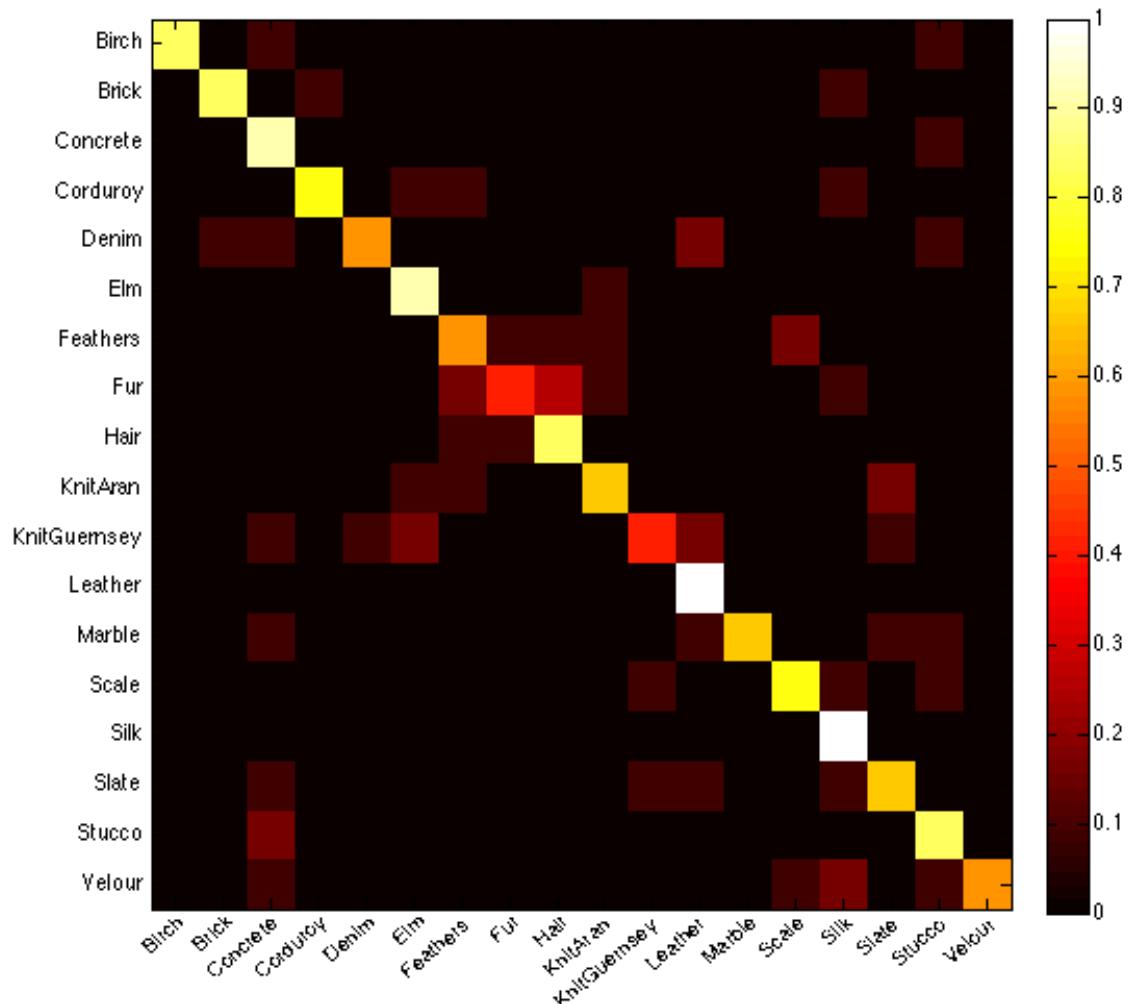


Figure 38: *Naive Bayes* confusion matrix trained with ground truth data and classifying predicted data. Obtained using *PHOW* limited to 2000 descriptors per image, 500 *K-means* clusters and *SVM lambda* 1e-6.

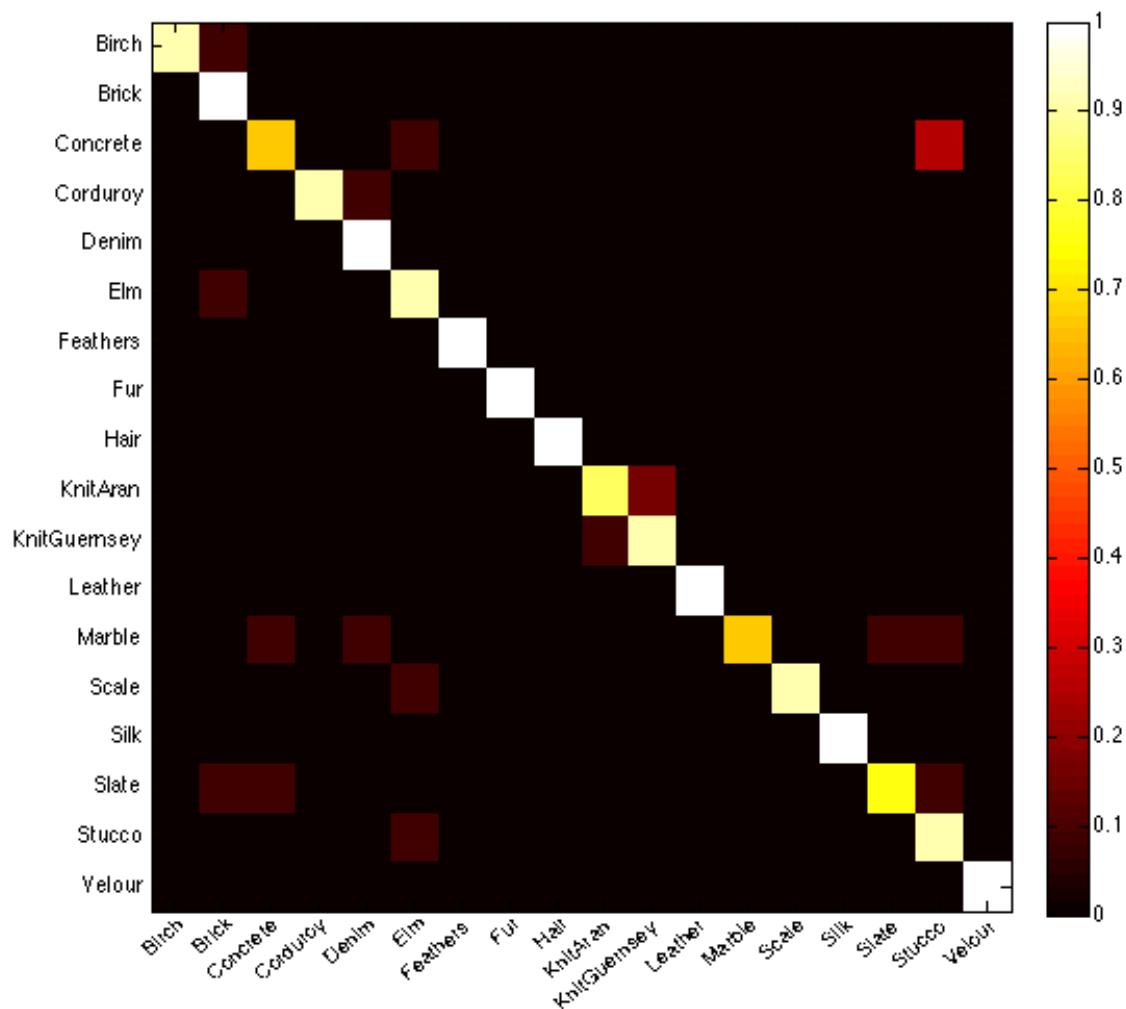


Figure 39: SVMs confusion matrix trained with ground truth data and classifying ground truth data. Obtained using PHOW limited to 2000 descriptors per image, 500 K-means clusters and SVM λ 1e-6.

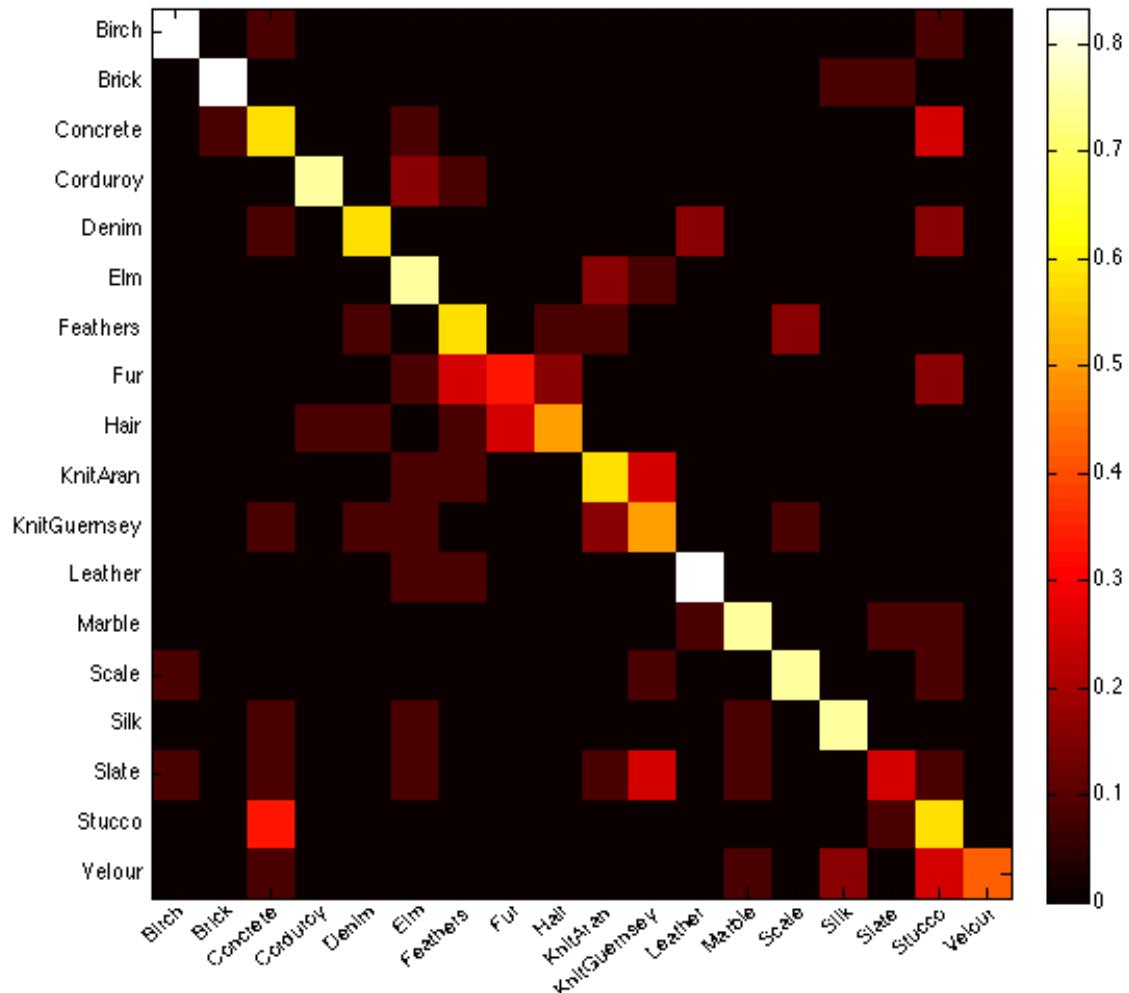


Figure 40: SVMs confusion matrix trained with ground truth data and classifying predicted data. Obtained using PHOW limited to 2000 descriptors per image, 500 K-means clusters and SVM $\lambda = 1e-6$.

3 Property detection accuracy bar charts.

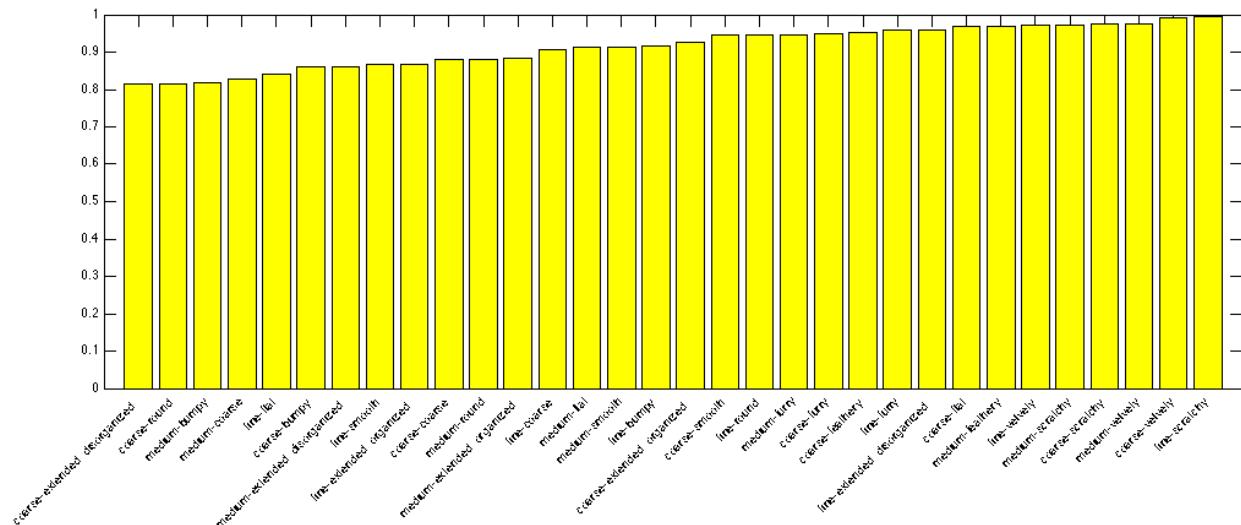


Figure 41: Bar chart with the global accuracy obtained in test data using SVMs to detect properties, sorted by global accuracy.

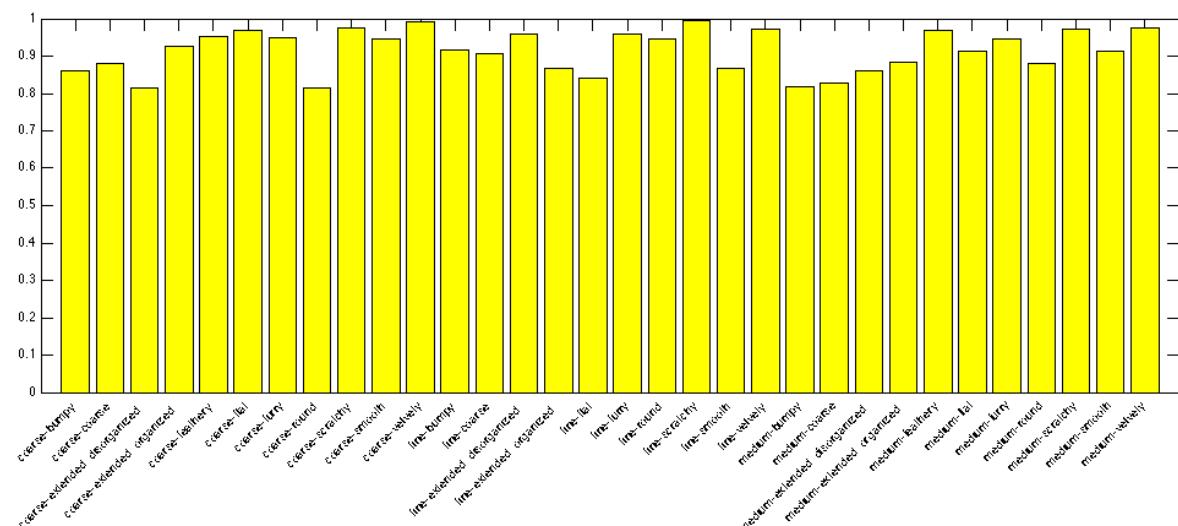


Figure 42: Bar chart with the global accuracy obtained in test data using SVMs to detect properties, sorted by property name.

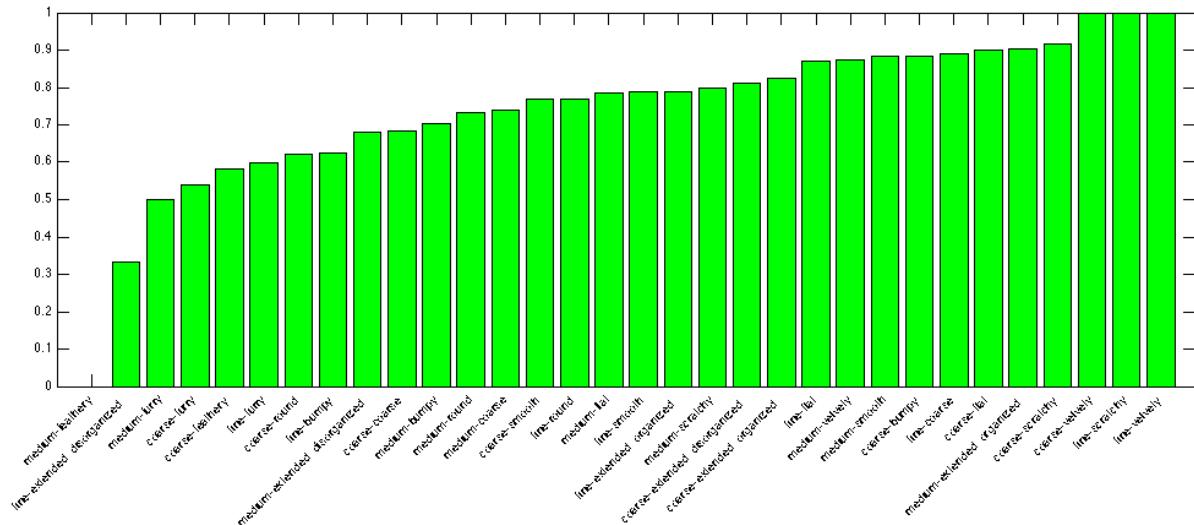


Figure 43: Bar chart with the precision obtained in test data using SVMs to detect properties, sorted by precision.

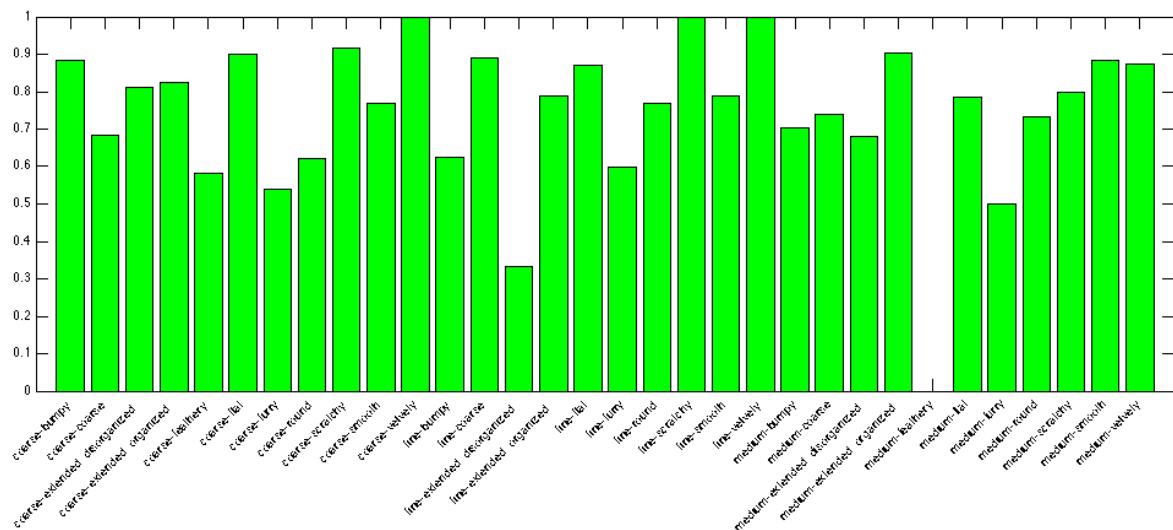


Figure 44: Bar chart with the precision obtained in test data using SVMs to detect properties, sorted by property name.

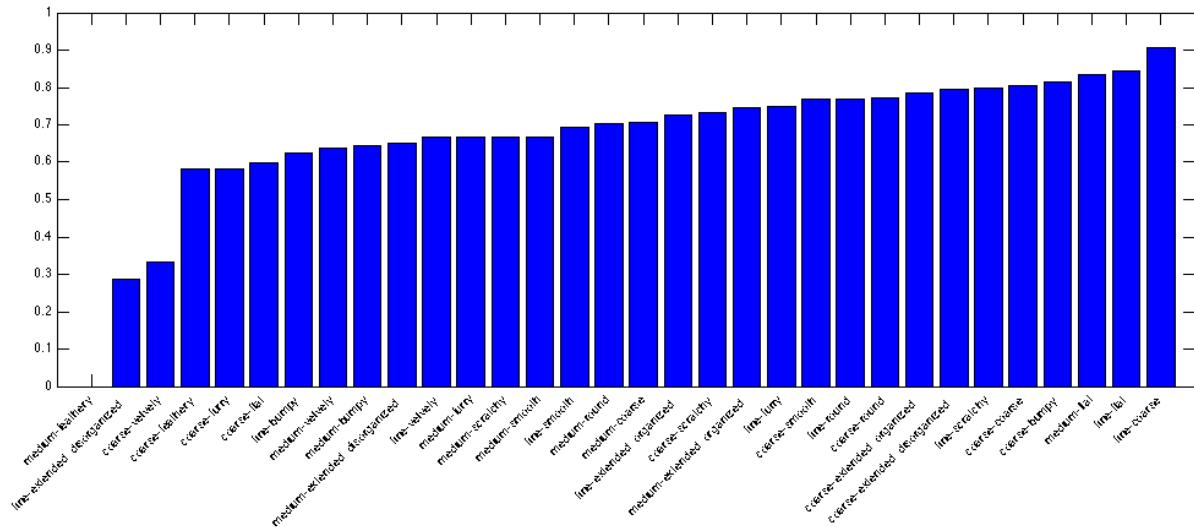


Figure 45: Bar chart with the recall obtained in test data using SVMs to detect properties, sorted by recall.

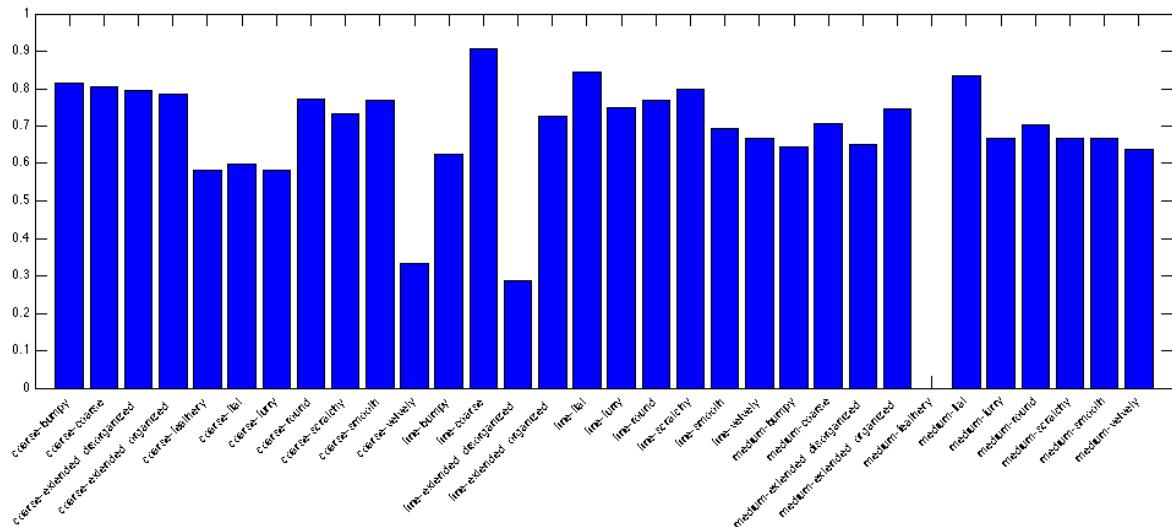


Figure 46: Bar chart with the recall obtained in test data using SVMs to detect properties, sorted by property name.