lab9

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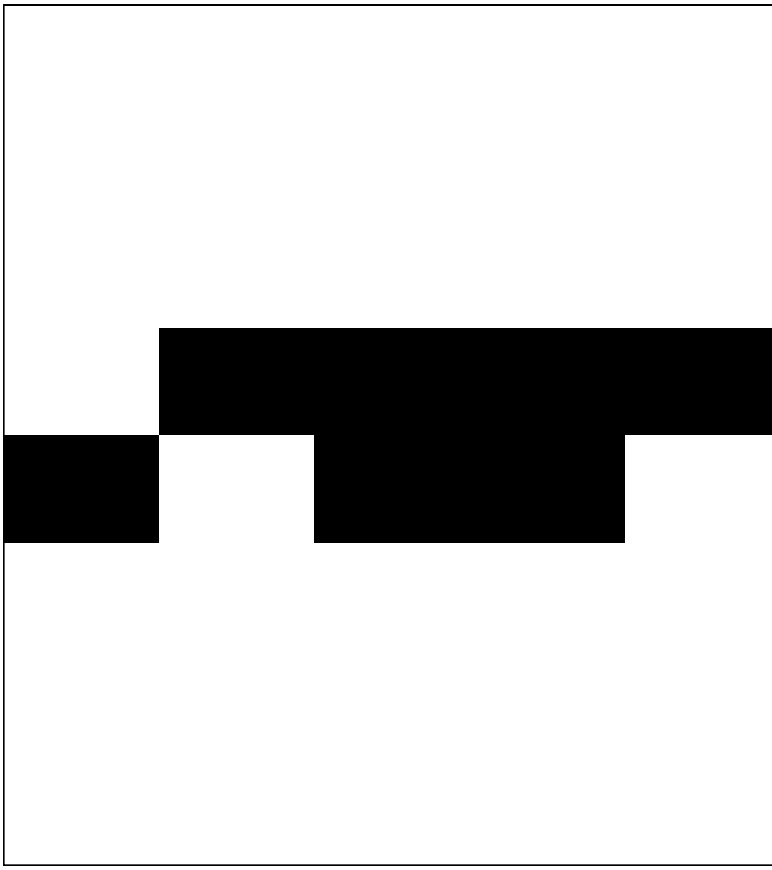
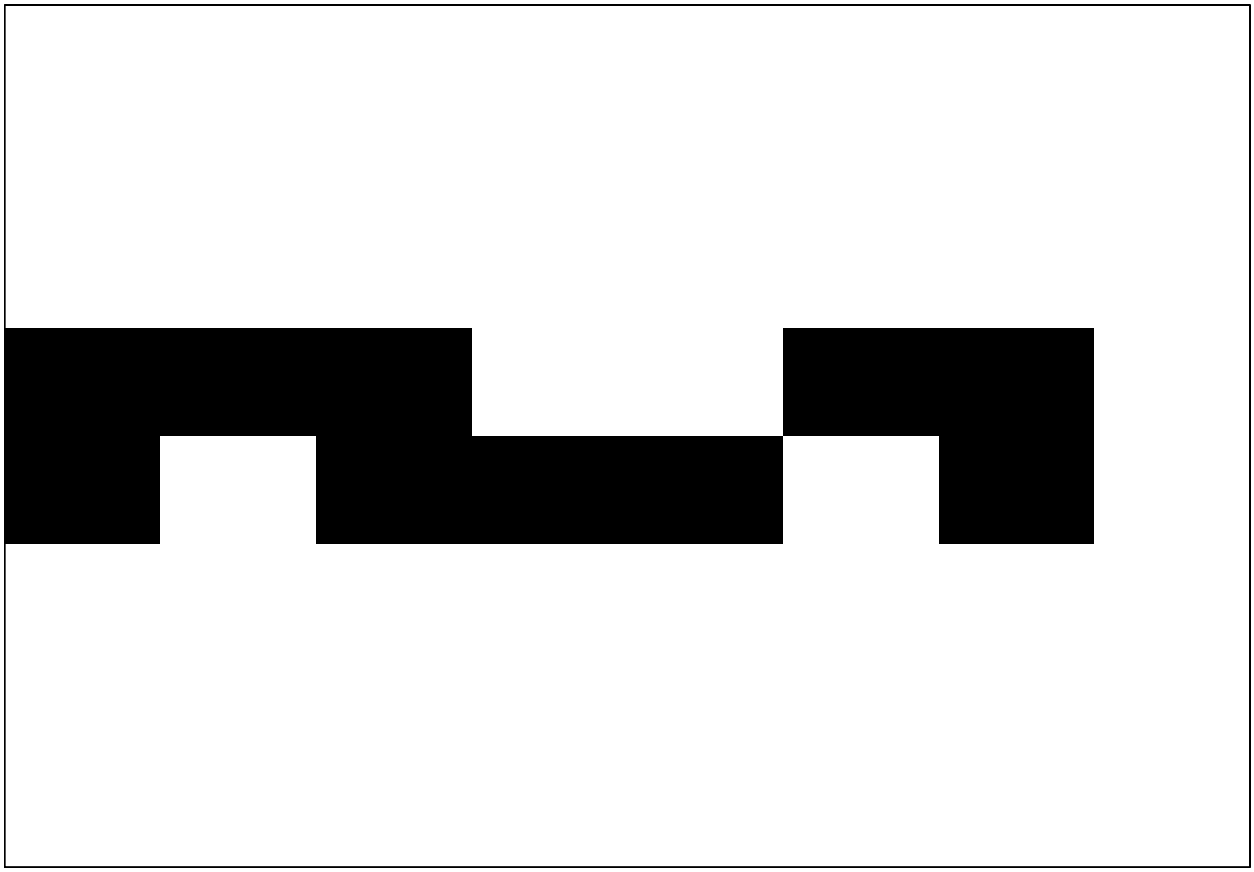
```
##   letter V7 V8 V9 V10 V11 V12 V13 V14 V23 V24 V25 V26 V27 V28 V29 V30 V39
## 1      o  0  0  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## 2      m  0  0  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## 3      m  0  0  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## 4      a  0  0  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## 5      n  0  0  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
## 6      d  0  0  0   0   0   0   0   0   0   1   1   0   0   0   0   0   0
##   V40 V41 V42 V43 V44 V45 V46 V55 V56 V57 V58 V59 V60 V61 V62 V71 V72 V73
## 1   1   1   1   1   1   0   0   1   1   0   0   0   0   1   1   1   0   0
## 2   0   0   0   0   0   0   0   0   1   1   1   1   1   1   0   1   0   1
## 3   0   0   0   0   0   0   0   1   1   1   0   0   1   1   0   1   0   1
## 4   0   0   0   0   0   0   0   0   1   1   0   0   0   0   0   1   0   0
## 5   0   0   0   1   1   1   0   0   0   1   1   0   0   1   0   1   1   1
## 6   1   0   1   1   0   0   0   0   0   1   0   1   1   0   0   0   0   1
##   V74 V75 V76 V77 V78 V87 V88 V89 V90 V91 V92 V93 V94 V103 V104 V105 V106
## 1   0   0   0   0   1   1   0   0   0   0   0   1   1    1    1    1    1
## 2   1   0   0   0   1   0   0   0   0   0   0   0   0    0    0    0    0
## 3   1   1   0   1   0   0   0   0   0   0   0   0   0    0    0    0    0
## 4   1   0   1   1   0   0   0   0   0   0   0   1   1    0    0    0    0
## 5   0   0   0   1   0   1   1   0   0   0   0   1   0    1    0    0    0
## 6   1   0   0   1   0   0   1   1   1   0   0   1   0    1    0    0    1
##   V107 V108 V109 V110 V119 V120 V121 V122 V123 V124 V125 V126
## 1    1    0    0    0    0    0    0    0    0    0    0    0
## 2    0    0    0    0    0    0    0    0    0    0    0    0
## 3    0    0    0    0    0    0    0    0    0    0    0    0
## 4    0    0    0    0    0    0    0    0    0    0    0    0
## 5    0    0    0    1    0    0    0    0    0    0    0    0
## 6    1    1    0    0    1    1    1    0    1    1    1    1
```

The rows represent letters and the columns represent whether certain pixels are colored in.

The letter I chose is M. This is how a couple of the M's look.



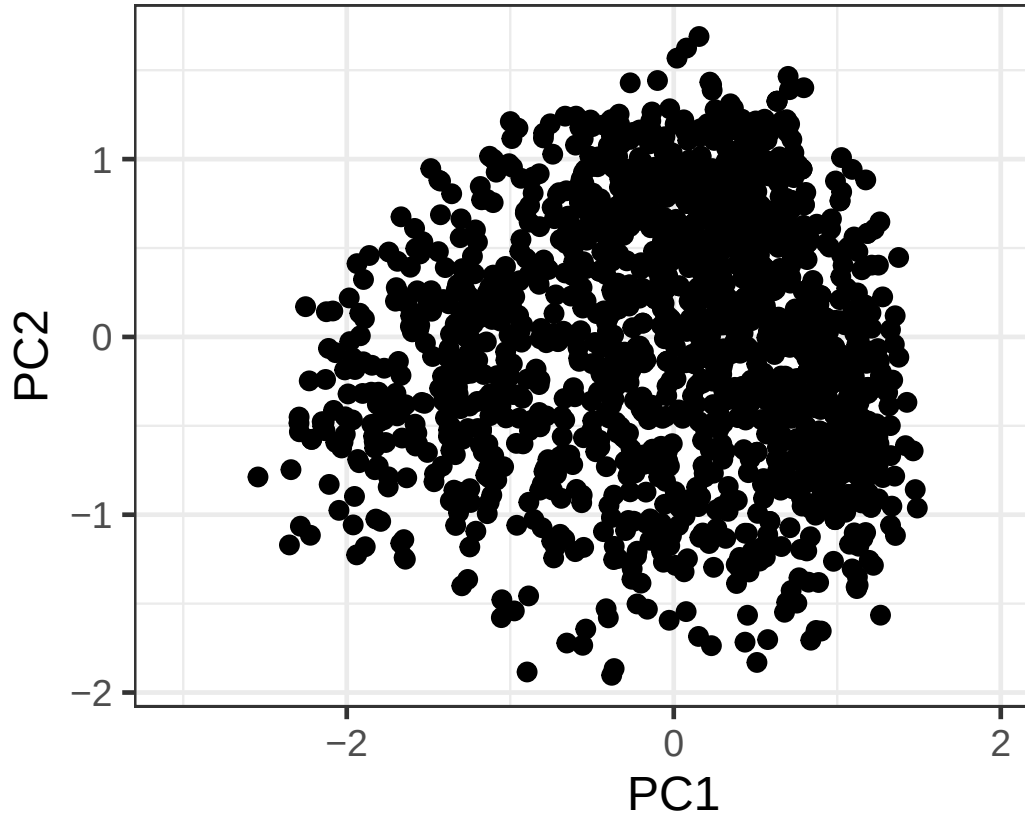


This is the compilation of the average "M".

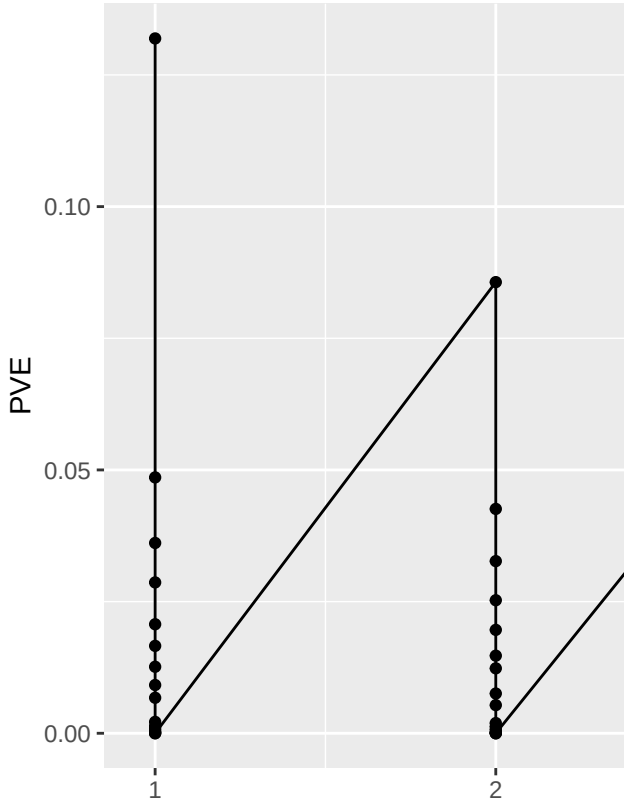
```
## [1] 1602   65
```

```
##           V7           V8           V9          V10          V11
## 0.0000000000 0.0000000000 0.0006242197 0.0006242197 0.0000000000
##          V12          V13          V14          V23          V24
## 0.0000000000 0.0000000000 0.0018726592 0.0093632959 0.0093632959
##          V25          V26          V27          V28          V29
## 0.0106117353 0.0081148564 0.0068664170 0.0074906367 0.0137328340
##          V30          V39          V40          V41          V42
## 0.0187265918 0.1704119850 0.1260923845 0.1760299625 0.1360799001
##          V43          V44          V45          V46          V55
## 0.1079900125 0.1754057428 0.2097378277 0.1635455680 0.8152309613
##          V56          V57          V58          V59          V60
## 0.6828963795 0.7159800250 0.6791510612 0.5992509363 0.6710362047
##          V61          V62          V71          V72          V73
## 0.6504369538 0.5911360799 0.9394506866 0.5998751561 0.2990012484
##          V74          V75          V76          V77          V78
## 0.6828963795 0.7109862672 0.2933832709 0.2865168539 0.8470661673
##          V87          V88          V89          V90          V91
## 0.6086142322 0.1928838951 0.0586766542 0.2228464419 0.1922596754
##          V92          V93          V94         V103         V104
## 0.0474406991 0.0830212235 0.5568039950 0.0836454432 0.0193508115
##         V105         V106         V107         V108         V109
## 0.0068664170 0.0112359551 0.0087390762 0.0099875156 0.0093632959
##         V110         V119         V120         V121         V122
```

```
## 0.0530586767 0.0074906367 0.0006242197 0.0006242197 0.0006242197
##         V123         V124         V125         V126
## 0.0012484395 0.0006242197 0.0012484395 0.0012484395
```



Looking at the principle components.



Looking at proportion of variance explained by each PC with a scree plot.