|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Notransformmodel# | 1 | 2 | 3 | 4 | 5 | 6 |
|  | MAD\_mode  L2  L4  Lskewness | IQ  L2  L4  Lskewness | Elev\_AAD  Elev\_MAD\_median  Elev\_L2  Elev\_L4 | Elev\_variance  Elev\_IQ  Elev\_MAD\_mode  Elev\_L  Elev\_L4  Elev\_Lskewness  Elev\_Lkurtosis | Elev\_variance  Elev\_IQ  Elev\_L2  Elev\_L4  Elev\_Lskewness |  |
|  | Elev\_ave  Elev\_P01  Elev\_P05  Elev\_P10  Elev\_P25  Elev\_P40  Elev\_P60  Elev\_P80 | Ave  Mode  01  10  25  40  75 | Elev\_ave  Elev\_P01  Elev\_P10  Elev\_P20  Elev\_P25  Elev\_P40  Elev\_P80 | Elev\_ave  Elev\_P01  Elev\_P10  Elev\_P40 | Elev\_ave  Elev\_P10  Elev\_P20  Elev\_P30  Elev\_P40 |  |
|  | Pct\_first\_returns\_above\_ht  Pct\_all\_returns\_above\_ht  all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100  Pct\_first\_returns\_above\_mean | Pct\_first\_returns\_above\_ht  Pct\_all\_returns\_above\_ht  Pct\_first\_returns\_above\_mean  Pct\_first\_returns\_above\_mode  pct\_all\_returns\_above\_mode  All\_returns\_above\_mean\_div\_Total\_first\_returns\_x\_100  All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100 | Pct\_first\_returns\_above\_ht  Pct\_all\_returns\_above\_ht  all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100  pct\_all\_returns\_above\_mean  All\_returns\_above\_mean\_div\_Total\_first\_returns\_x\_100 | Pct\_first\_returns\_above\_ht  Pct\_all\_returns\_above\_ht  all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100  All\_returns\_above\_mean\_div\_Total\_first\_returns\_x\_100 | Pct\_first\_returns\_above\_ht  Pct\_all\_returns\_above\_ht  all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100  Pct\_first\_returns\_above\_mean  pct\_all\_returns\_above\_mean |  |
|  | NDVIamp | elevation  aspect | elevation  slope | NDVI | NDVI\_Amp |  |
|  | F |  | R3ERUlabelF  R3ERUlabelG |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Log transform model# | 1 | 2 | 4 | 5 | 7 | 8 | 9 |
|  | Elev\_IQ  Elev\_AAD  Elev\_L2  Elev\_L3  Elev\_Lskewness | Elev\_IQ  Elev\_AAD  Elev\_L3  Elev\_L4  Elev\_Lskewness | Elev\_skewness  Elev\_L2  Elev\_L3  Elev\_L4  Elev\_Lskewness | Elev\_kurtosis  Elev\_L2  Elev\_L3  Elev\_L4 | Elev\_L4 |  |  |
|  | Elev\_mode  Elev\_P05  Elev\_P10  Elev\_P60 | Elev\_P05  Elev\_P10  Elev\_P60 | Elev\_P10  Elev\_P25  Elev\_P60  Elev\_P80 | Elev\_ave  Elev\_P10  Elev\_P20  Elev\_P25  Elev\_P30  Elev\_P40  Elev\_P50  Elev\_P90 | Elev\_mode  Elev\_P25  Elev\_P50  Elev\_P60  Elev\_P90 |  |  |
|  | Pct\_first\_returns\_above\_mean  pct\_all\_returns\_above\_mean  All\_returns\_above\_mean\_div\_Total\_first\_returns\_x\_100 | Pct\_first\_returns\_above\_mode  pct\_all\_returns\_above\_mean  All\_returns\_above\_mean\_div\_Total\_first\_returns\_x\_100  All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100 | Pct\_first\_returns\_above\_ht  Pct\_all\_returns\_above\_ht | pct\_all\_returns\_above\_mean | Pct\_first\_returns\_above\_mean  pct\_all\_returns\_above\_mean  All\_returns\_above\_mean\_div\_Total\_first\_returns\_x\_100 |  |  |
|  | elevation  slope | elevation  slope  NDVI | elevation | slope | NDVI |  |  |
|  | EFG | EFG | EFG | EFG | BEFG |  |  |
|  |  |  |  |  |  |  |  |

**DataPrep**, which should be run in full (it is sourced in the Modeling file) ->

**Modeling**, which has a few essential parts (mainly the last two models, and the building a BMA object for each variable), and many bits that are optional ->

**Predictions**, which generates the new data and compares to the reserved portion of the original data, and has some performance metrics to look at ->

**Validation**, which generates new data for the validation data set, and then looks at performance ->

**Outputs**, which is just for making a tidy collection of tables and so on for inclusion in the paper. Probably some nice plots should be added to this for looking at how the models perform, but I didn't get around to doing that.

+ Elev\_mode \* Pct\_all\_returns\_above\_ht + Elev\_mode \* pct\_all\_returns\_above\_mean + Elev\_mode \* all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100 + Elev\_mode \* All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100

+ Elev\_P01 \* Pct\_all\_returns\_above\_ht + Elev\_P01 \* pct\_all\_returns\_above\_mean + Elev\_P01 \* all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100 + Elev\_P01 \* All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100 +

Elev\_P05 \* Pct\_all\_returns\_above\_ht + Elev\_P05 \* pct\_all\_returns\_above\_mean + Elev\_P05 \* all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100 + Elev\_P05 \* All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100 +

Elev\_P10 \* Pct\_all\_returns\_above\_ht + Elev\_P10 \* pct\_all\_returns\_above\_mean + Elev\_P10 \* all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100 + Elev\_P10 \* All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100 +

Elev\_P30 \* Pct\_all\_returns\_above\_ht + Elev\_P30 \* pct\_all\_returns\_above\_mean + Elev\_P30 \* all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100 + Elev\_P30 \* All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100 +

Elev\_P60 \* Pct\_all\_returns\_above\_ht +Elev\_P60 \* pct\_all\_returns\_above\_mean + Elev\_P60 \* all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100 + Elev\_P60 \* All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100 +

Elev\_P90 \* Pct\_all\_returns\_above\_ht + Elev\_P90 \* pct\_all\_returns\_above\_mean + Elev\_P90 \* all\_returns\_above\_ht\_div\_Total\_first\_returns\_x\_100 + Elev\_P90 \* All\_returns\_above\_mode\_div\_Total\_first\_returns\_x\_100

1. canopy density: **~~% first canopy returns~~**~~, % of first returns above the mean, % of first returns above the mode~~, % all canopy returns, % of all returns above the mean, ~~% of all returns above the mode,~~ the ratio of all returns: total first returns, ~~the ratio of all returns above mean: total first returns~~, and the ratio of all returns above mode: total first returns

2. height distributions metrics: **~~mean~~**, mode, percentiles (1st, 5th, **10th**, ~~20th,~~**~~25th~~**, 30th, ~~40th,~~**~~50th~~**, 60th, ~~70th,~~**~~75th~~**~~, 80th~~, **90th**, ~~95th, and~~**~~99th~~**)

3. Height shape metrics: standard deviation, ~~variance,~~**~~coefficient of variation~~**~~, interquartile distance, skewness~~, kurtosis, ~~average absolute deviation~~, median absolute deviation, mode absolute deviation, L-moments (L1, ~~L2~~, L3, L4), L-moment coefficient of variation, L-moment skewness, and L-moment kurtosis