Met Objects Dummy Variables & Correlation

Code

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```
#Look at objects and features columns
head(MetObjects_copy)
```

…	objectNumber	isHighlight	isPublic	objectID	Department	objectNa…
<int>	<chr>	<lgl>	<lgl>	<int>	<chr>	<chr>
1	1979.486.1	FALSE	FALSE	1	American Decorative Arts	Coin
2	1980.264.5	FALSE	FALSE	2	American Decorative Arts	Coin
3	67.265.9	FALSE	FALSE	3	American Decorative Arts	Coin
4	67.265.10	FALSE	FALSE	4	American Decorative Arts	Coin
5	67.265.11	FALSE	FALSE	5	American Decorative Arts	Coin
6	67.265.12	FALSE	FALSE	6	American Decorative Arts	Coin

6 rows | 1-7 of 83 columns

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```
# reclass "Departments" into binary
MetObjects_copy$isDept1[MetObjects_copy$Department == "American Decorative Arts"] <- 1
MetObjects_copy$isDept1[MetObjects_copy$Department != "American Decorative Arts"] <- 0
MetObjects_copy$isDept2[MetObjects_copy$Department == "American Paintings and Sculpture"
] <- 1
MetObjects_copy$isDept2[MetObjects_copy$Department != "American Paintings and Sculpture"
] <- 0
MetObjects_copy$isDept3[MetObjects_copy$Department == "Ancient Near Eastern Art"] <- 1
MetObjects_copy$isDept3[MetObjects_copy$Department != "Ancient Near Eastern Art"] <- 0
MetObjects_copy$isDept4[MetObjects_copy$Department == "Arms and Armor"] <- 1
MetObjects_copy$isDept4[MetObjects_copy$Department != "Arms and Armor"] <- 0
MetObjects_copy$isDept5[MetObjects_copy$Department == "Arts of Africa, Oceania, and the
 Americas"] <- 1
MetObjects_copy$isDept5[MetObjects_copy$Department != "Arts of Africa, Oceania, and the
 Americas"] <- 0
MetObjects_copy$isDept6[MetObjects_copy$Department == "Asian Art"] <- 1
MetObjects_copy$isDept6[MetObjects_copy$Department != "Asian Art"] <- 0
MetObjects_copy$isDept7[MetObjects_copy$Department == "Costume Institute"] <- 1
MetObjects_copy$isDept7[MetObjects_copy$Department != "Costume Institute"] <- 0
MetObjects_copy$isDept8[MetObjects_copy$Department == "Egyptian Art"] <- 1
MetObjects_copy$isDept8[MetObjects_copy$Department != "Egyptian Art"] <- 0
MetObjects_copy$isDept9[MetObjects_copy$Department == "European Paintings"] <- 1
MetObjects_copy$isDept9[MetObjects_copy$Department != "European Paintings"] <- 0
MetObjects_copy$isDept10[MetObjects_copy$Department == "European Sculpture and Decorativ
e Arts"] <- 1
MetObjects_copy$isDept10[MetObjects_copy$Department != "European Sculpture and Decorativ
e Arts"] <- 0
MetObjects_copy$isDept11[MetObjects_copy$Department == "Greek and Roman Art"] <- 1
MetObjects_copy$isDept11[MetObjects_copy$Department != "Greek and Roman Art"] <- 0
MetObjects_copy$isDept12[MetObjects_copy$Department == "Islamic Art"] <- 1
MetObjects_copy$isDept12[MetObjects_copy$Department != "Islamic Art"] <- 0
MetObjects_copy$isDept13[MetObjects_copy$Department == "Medieval Art"] <- 1
MetObjects_copy$isDept13[MetObjects_copy$Department != "Medieval Art"] <- 0
MetObjects_copy$isDept14[MetObjects_copy$Department == "Modern and Contemporary Art"] <-
 1
MetObjects_copy$isDept14[MetObjects_copy$Department != "Modern and Contemporary Art"] <-
 0
MetObjects_copy$isDept15[MetObjects_copy$Department == "Musical Instruments"] <- 1
MetObjects_copy$isDept15[MetObjects_copy$Department != "Musical Instruments"] <- 0
MetObjects_copy$isDept16[MetObjects_copy$Department == "Photographs"] <- 1
MetObjects_copy$isDept16[MetObjects_copy$Department != "Photographs"] <- 0
MetObjects_copy$isDept17[MetObjects_copy$Department == "Robert Lehman Collection"] <- 1
MetObjects_copy$isDept17[MetObjects_copy$Department != "Robert Lehman Collection"] <- 0
MetObjects_copy$isDept18[MetObjects_copy$Department == "The Libraries"] <- 1
MetObjects_copy$isDept18[MetObjects_copy$Department != "The Libraries"] <- 0
MetObjects_copy$isDept19[MetObjects_copy$Department == "Drawings and Prints"] <- 1
MetObjects_copy$isDept19[MetObjects_copy$Department != "Drawings and Prints"] <- 0
```

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```
#Rename date columns to be usable
colnames(MetObjects_copy)[22] <- "objectDateRange"
colnames(MetObjects_copy)[23] <- "objectBeginDate"
colnames(MetObjects_copy)[24] <- "objectEndDate"
```

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```
install.packages('dplyr')
library(dplyr)

#create new csv copies
write.csv(MetObjects_copy, file = "MetObjects_copy.csv")

#Work with new MetObjects_copy-copy file
MetObjects_copy.csv <- "MetObjects_copy"

#remove non-numerical columns
MetObjects_ce <- select(MetObjects_copy, -isHighlight, -isPublic, -objectName, -Culture,
 -Title, -Period, -Dynasty, -Reign, -Portfolio, -artistRole, -artistPrefix, -artistDispl
ayName, -artistSuffix, -artistAlphaSort, -artistNationality, -objectDateRange, -Dimensio
ns, -creditLine, -geographyType, -City, -State, -County, -Country, -Region, -Subregion,
-Locale, -Locus, -Excavation, -River, -Classification, -rightsReproduction, -linkResolut
ion, -metadataDate, -Repository, -Medium, -artistDisplayBio, -Department, -objectNumber,
 -artistBeginDate, -artistEndDate)
```

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```
library(corrplot)
```

```
corrplot 0.84 loaded
```

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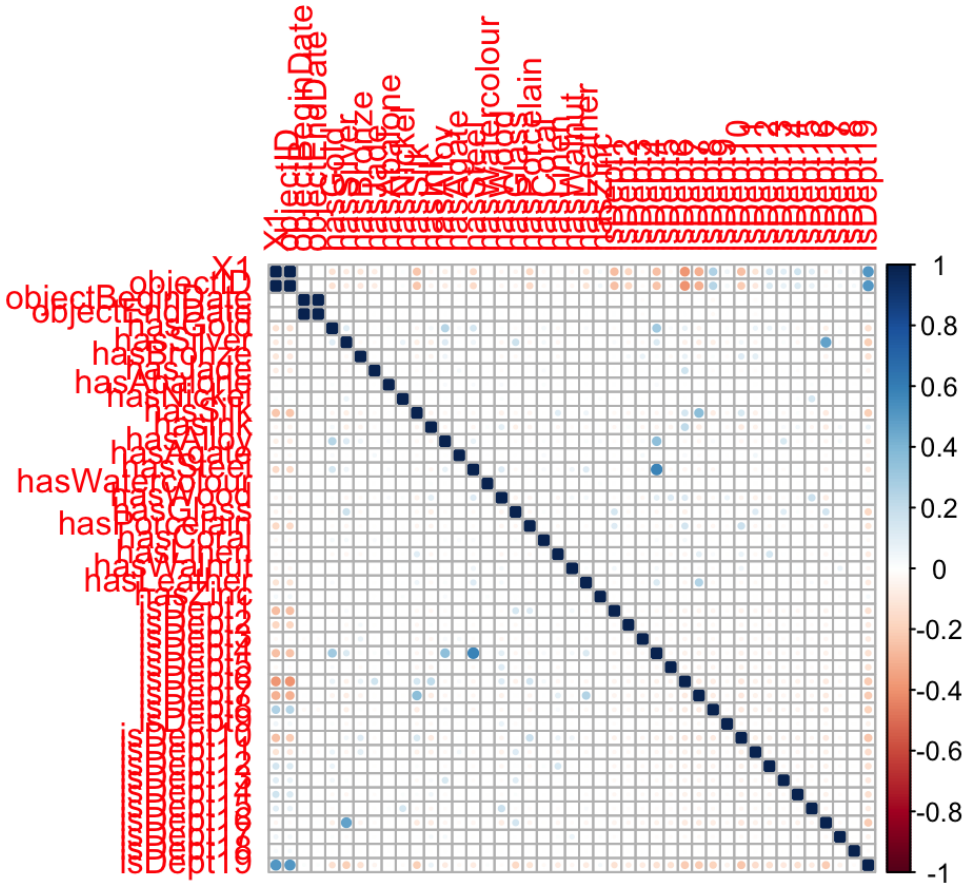
```
corrmatrix <- cor(MetObjects_ce, use="complete.obs")
View(corrmatrix)
corrplot(corrmatrix, method="circle") # corrmatrix is the name of the correlation matrix
 we created above
```



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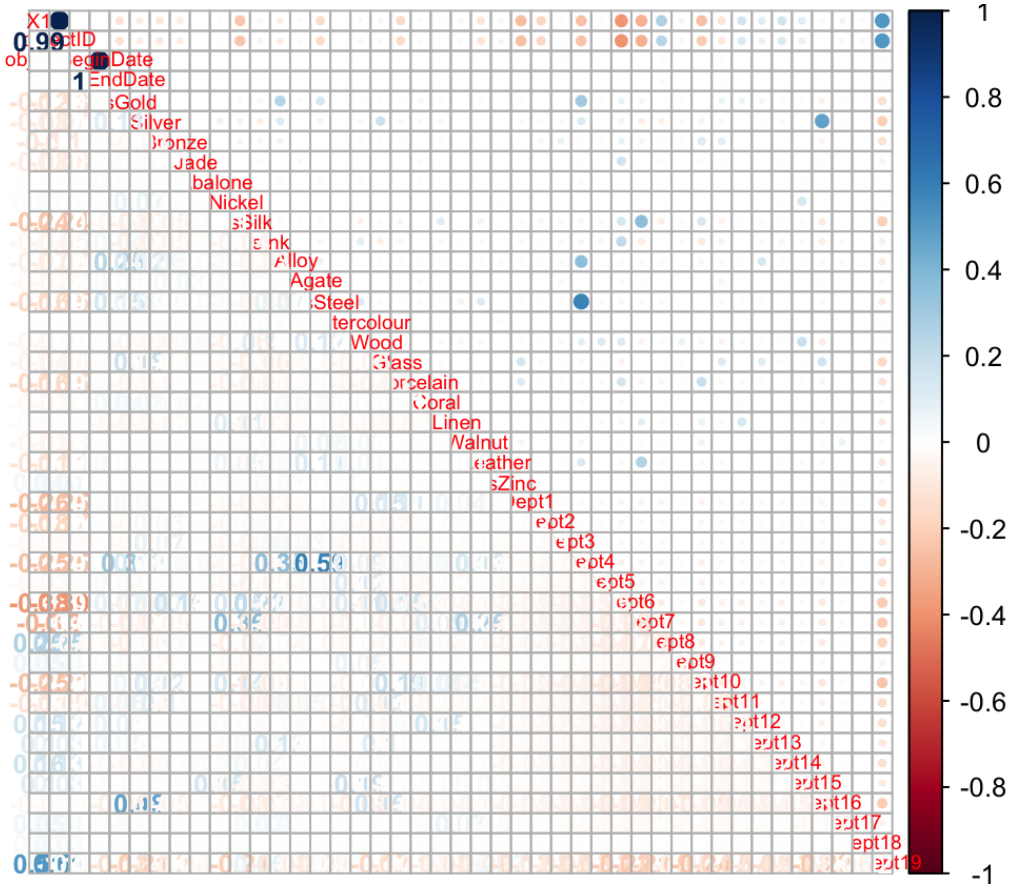
```
corrplot.mixed(corrmatrix, number.cex = 0.8, tl.cex = 0.6)
```



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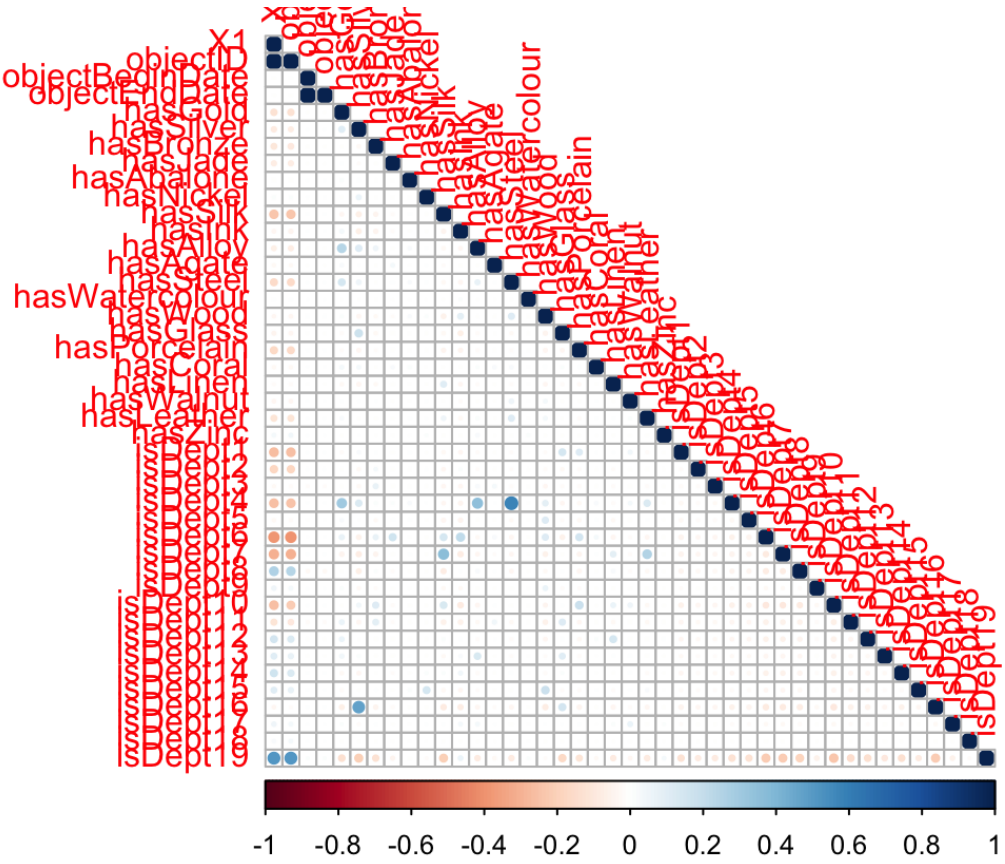
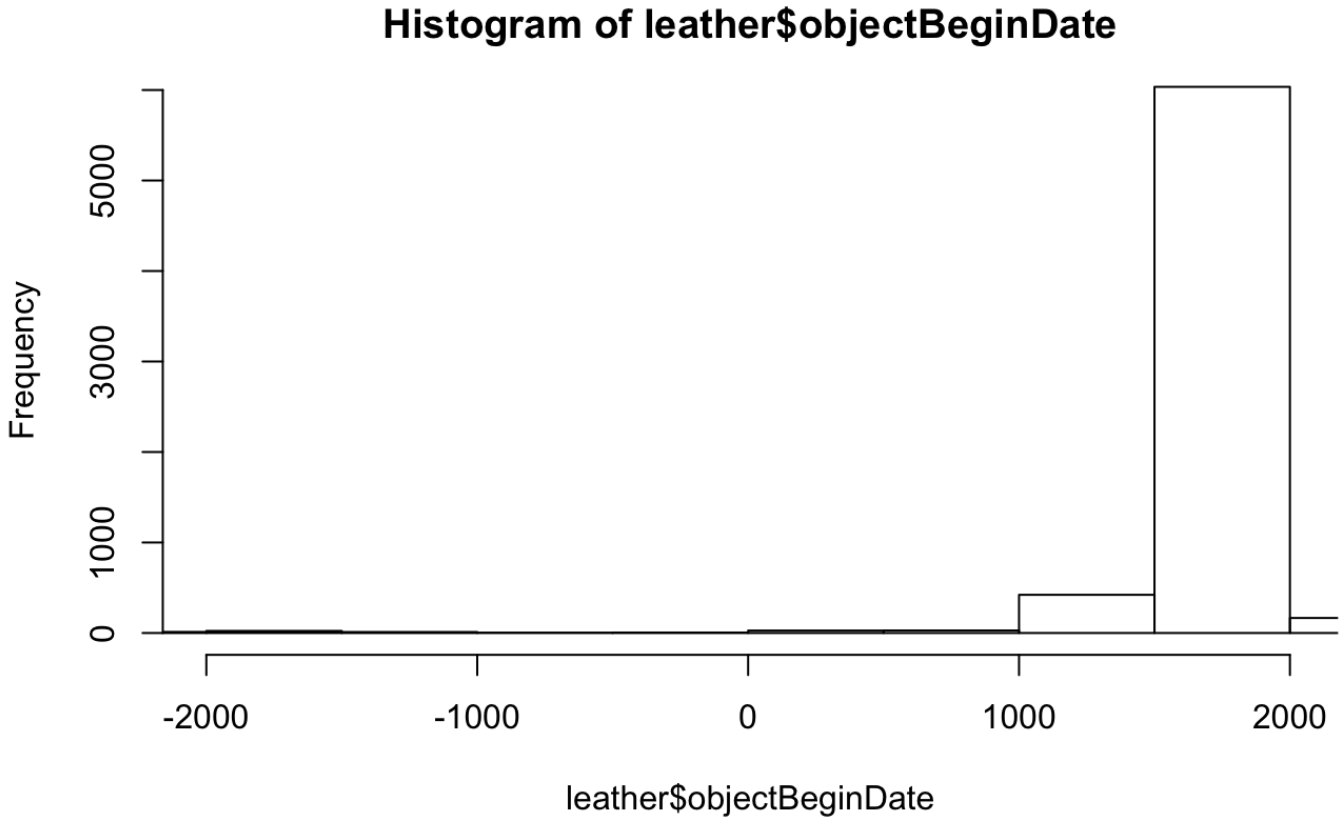
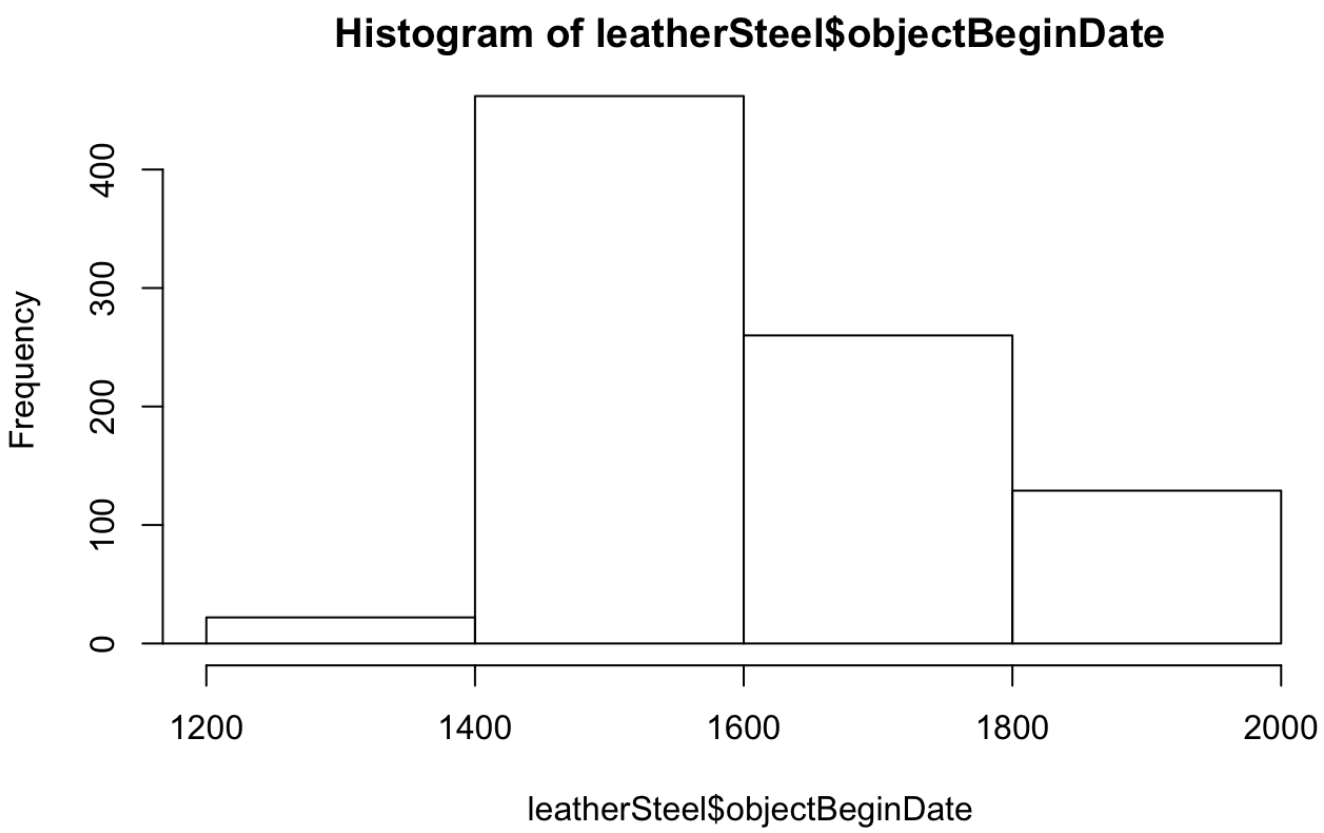
```
#number.cex changes the size of the number fonts. tl.cex changes the size of the labels
corrplot(corrmatrix, type="lower")
```







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```
summary(regression_1)
```

```
Call:
lm(formula = objectBeginDate ~ isDept1 + isDept2 + isDept3 +
    isDept4 + isDept5 + isDept6 + isDept7 + isDept8 + isDept9 +
    isDept10 + isDept11 + isDept12 + isDept13 + isDept14 + isDept15 +
    isDept16 + isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
  -93467     -114       -9       68 18589943

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   1290.9      535.6   2.410   0.0159 *
isDept1        524.5      589.4   0.890   0.3735
isDept2        544.4      651.6   0.836   0.4034
isDept3      -2587.9      639.4  -4.048 5.17e-05 ***
isDept4        274.9      585.4   0.470   0.6386
isDept5        -79.6      589.6  -0.135   0.8926
isDept6        111.5      554.3   0.201   0.8406
isDept7        609.3      555.8   1.096   0.2730
isDept8      -2823.7      560.5  -5.037 4.72e-07 ***
isDept9        415.8      746.2   0.557   0.5774
isDept10       431.5      551.9   0.782   0.4343
isDept11     -2478.6      574.6  -4.313 1.61e-05 ***
isDept12      -204.8      579.7  -0.353   0.7238
isDept13      -388.7      624.1  -0.623   0.5334
isDept14       649.5      582.6   1.115   0.2649
isDept15       444.8      654.8   0.679   0.4970
isDept16       617.0      554.3   1.113   0.2656
isDept17       355.5      760.3   0.468   0.6401
isDept18       520.3     2028.5   0.256   0.7976
isDept19       627.0      539.9   1.161   0.2455
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 27460 on 458638 degrees of freedom
  (167 observations deleted due to missingness)
Multiple R-squared:  0.001378,  Adjusted R-squared:  0.001336
F-statistic:  33.3 on 19 and 458638 DF,  p-value: < 2.2e-16
```

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```
summary(regression_2)
```

```
Call:
lm(formula = hasGold ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.37830 -0.03783 -0.00571 -0.00487  0.99986

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.072353   0.003586  20.175  < 2e-16 ***
isDept1     -0.052612   0.003946 -13.332  < 2e-16 ***
isDept2     -0.039842   0.004362  -9.133  < 2e-16 ***
isDept3     -0.036778   0.004281  -8.592  < 2e-16 ***
isDept4      0.305951   0.003920  78.058  < 2e-16 ***
isDept5     -0.007322   0.003948  -1.855 0.063656 .
isDept6      0.014215   0.003712   3.830 0.000128 ***
isDept7     -0.066645   0.003722 -17.908  < 2e-16 ***
isDept8     -0.036708   0.003753  -9.780  < 2e-16 ***
isDept9      0.009637   0.004995   1.929 0.053704 .
isDept10    -0.034524   0.003695  -9.343  < 2e-16 ***
isDept11     0.029923   0.003848   7.777 7.43e-15 ***
isDept12     0.032645   0.003882   8.410  < 2e-16 ***
isDept13     0.040469   0.004179   9.684  < 2e-16 ***
isDept14    -0.059737   0.003901 -15.314  < 2e-16 ***
isDept15    -0.066704   0.004384 -15.214  < 2e-16 ***
isDept16    -0.072218   0.003712 -19.456  < 2e-16 ***
isDept17    -0.005120   0.005090  -1.006 0.314505
isDept18    -0.072353   0.013576  -5.330 9.85e-08 ***
isDept19    -0.067480   0.003615 -18.666  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1838 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.1213,    Adjusted R-squared:  0.1212
F-statistic:  3330 on 19 and 458507 DF,  p-value: < 2.2e-16
```

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```
summary(regression_3)
```

```
Call:
lm(formula = hasSilver ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.50193 -0.06234 -0.00805 -0.00065  0.99935

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.131759   0.004404  29.917  < 2e-16 ***
isDept1     -0.020051   0.004846  -4.138 3.51e-05 ***
isDept2     -0.117513   0.005357 -21.935  < 2e-16 ***
isDept3     -0.102975   0.005257 -19.589  < 2e-16 ***
isDept4      0.128959   0.004813  26.792  < 2e-16 ***
isDept5     -0.057449   0.004848 -11.849  < 2e-16 ***
isDept6     -0.104727   0.004558 -22.976  < 2e-16 ***
isDept7     -0.123709   0.004570 -27.068  < 2e-16 ***
isDept8     -0.121632   0.004609 -26.388  < 2e-16 ***
isDept9     -0.127105   0.006135 -20.719  < 2e-16 ***
isDept10    -0.020126   0.004538  -4.435 9.20e-06 ***
isDept11    -0.104106   0.004725 -22.033  < 2e-16 ***
isDept12    -0.057078   0.004767 -11.973  < 2e-16 ***
isDept13    -0.019755   0.005132  -3.849 0.000118 ***
isDept14    -0.103319   0.004790 -21.568  < 2e-16 ***
isDept15    -0.069424   0.005384 -12.894  < 2e-16 ***
isDept16     0.370166   0.004558  81.207  < 2e-16 ***
isDept17    -0.104325   0.006251 -16.688  < 2e-16 ***
isDept18    -0.126683   0.016672  -7.599 3.00e-14 ***
isDept19    -0.131113   0.004440 -29.532  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2257 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.2704,    Adjusted R-squared:  0.2704
F-statistic:  8945 on 19 and 458507 DF,  p-value: < 2.2e-16
```

Hide

```
summary(regression_4)
```

```
Call:
lm(formula = hasBronze ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.12646 -0.03825 -0.00073 -0.00005  0.99995

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  6.474e-03  3.077e-03   2.104 0.035410 *
isDept1      2.434e-02  3.386e-03   7.189 6.55e-13 ***
isDept2      6.531e-02  3.743e-03  17.446  < 2e-16 ***
isDept3      1.200e-01  3.673e-03  32.665  < 2e-16 ***
isDept4      3.825e-02  3.363e-03  11.373  < 2e-16 ***
isDept5     -1.899e-05  3.388e-03  -0.006 0.995528
isDept6      5.926e-02  3.185e-03  18.608  < 2e-16 ***
isDept7     -5.742e-03  3.193e-03  -1.798 0.072178 .
isDept8      2.816e-02  3.221e-03   8.742  < 2e-16 ***
isDept9     -6.474e-03  4.287e-03  -1.510 0.130980
isDept10     7.919e-02  3.171e-03  24.974  < 2e-16 ***
isDept11     1.017e-01  3.302e-03  30.811  < 2e-16 ***
isDept12     1.280e-02  3.331e-03   3.843 0.000122 ***
isDept13     1.247e-02  3.586e-03   3.476 0.000508 ***
isDept14     1.953e-02  3.347e-03   5.834 5.43e-09 ***
isDept15     3.063e-02  3.762e-03   8.141 3.94e-16 ***
isDept16    -6.474e-03  3.185e-03  -2.033 0.042101 *
isDept17     3.178e-02  4.368e-03   7.276 3.46e-13 ***
isDept18    -6.474e-03  1.165e-02  -0.556 0.578407
isDept19    -6.424e-03  3.102e-03  -2.071 0.038361 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1577 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.04793,   Adjusted R-squared:  0.04789
F-statistic:  1215 on 19 and 458507 DF,  p-value: < 2.2e-16
```

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```
summary(regression_5)
```

```
Call:
lm(formula = hasLeather ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.12301 -0.00533 -0.00081 -0.00019  0.99995

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.0087586  0.0022430   3.905 9.43e-05 ***
isDept1     -0.0055486  0.0024680  -2.248 0.024565 *
isDept2     -0.0012700  0.0027284  -0.465 0.641591
isDept3     -0.0079500  0.0026772  -2.970 0.002982 **
isDept4      0.0946106  0.0024514  38.595  < 2e-16 ***
isDept5      0.0066521  0.0024692   2.694 0.007059 **
isDept6     -0.0075397  0.0023214  -3.248 0.001163 **
isDept7      0.1142508  0.0023276  49.085  < 2e-16 ***
isDept8     -0.0069073  0.0023474  -2.942 0.003256 **
isDept9     -0.0087586  0.0031243  -2.803 0.005057 **
isDept10    -0.0034282  0.0023111  -1.483 0.137980
isDept11    -0.0087586  0.0024063  -3.640 0.000273 ***
isDept12     0.0005848  0.0024278   0.241 0.809655
isDept13    -0.0009918  0.0026136  -0.379 0.704326
isDept14    -0.0040186  0.0024396  -1.647 0.099518 .
isDept15     0.0281529  0.0027421  10.267  < 2e-16 ***
isDept16    -0.0087043  0.0023215  -3.750 0.000177 ***
isDept17    -0.0029626  0.0031837  -0.931 0.352083
isDept18    -0.0087586  0.0084908  -1.032 0.302288
isDept19    -0.0085678  0.0022610  -3.789 0.000151 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1149 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.08693,   Adjusted R-squared:  0.08689
F-statistic:  2297 on 19 and 458507 DF,  p-value: < 2.2e-16
```

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```
summary(regression_4)
```

```
Call:
lm(formula = hasBronze ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.12646 -0.03825 -0.00073 -0.00005  0.99995

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  6.474e-03  3.077e-03   2.104 0.035410 *
isDept1      2.434e-02  3.386e-03   7.189 6.55e-13 ***
isDept2      6.531e-02  3.743e-03  17.446  < 2e-16 ***
isDept3      1.200e-01  3.673e-03  32.665  < 2e-16 ***
isDept4      3.825e-02  3.363e-03  11.373  < 2e-16 ***
isDept5     -1.899e-05  3.388e-03  -0.006 0.995528
isDept6      5.926e-02  3.185e-03  18.608  < 2e-16 ***
isDept7     -5.742e-03  3.193e-03  -1.798 0.072178 .
isDept8      2.816e-02  3.221e-03   8.742  < 2e-16 ***
isDept9     -6.474e-03  4.287e-03  -1.510 0.130980
isDept10     7.919e-02  3.171e-03  24.974  < 2e-16 ***
isDept11     1.017e-01  3.302e-03  30.811  < 2e-16 ***
isDept12     1.280e-02  3.331e-03   3.843 0.000122 ***
isDept13     1.247e-02  3.586e-03   3.476 0.000508 ***
isDept14     1.953e-02  3.347e-03   5.834 5.43e-09 ***
isDept15     3.063e-02  3.762e-03   8.141 3.94e-16 ***
isDept16    -6.474e-03  3.185e-03  -2.033 0.042101 *
isDept17     3.178e-02  4.368e-03   7.276 3.46e-13 ***
isDept18    -6.474e-03  1.165e-02  -0.556 0.578407
isDept19    -6.424e-03  3.102e-03  -2.071 0.038361 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1577 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.04793,   Adjusted R-squared:  0.04789
F-statistic:  1215 on 19 and 458507 DF,  p-value: < 2.2e-16
```

Hide

```
summary(regression_5)
```

```
Call:
lm(formula = hasLeather ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.12301 -0.00533 -0.00081 -0.00019  0.99995

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.0087586  0.0022430   3.905 9.43e-05 ***
isDept1     -0.0055486  0.0024680  -2.248 0.024565 *
isDept2     -0.0012700  0.0027284  -0.465 0.641591
isDept3     -0.0079500  0.0026772  -2.970 0.002982 **
isDept4      0.0946106  0.0024514  38.595  < 2e-16 ***
isDept5      0.0066521  0.0024692   2.694 0.007059 **
isDept6     -0.0075397  0.0023214  -3.248 0.001163 **
isDept7      0.1142508  0.0023276  49.085  < 2e-16 ***
isDept8     -0.0069073  0.0023474  -2.942 0.003256 **
isDept9     -0.0087586  0.0031243  -2.803 0.005057 **
isDept10    -0.0034282  0.0023111  -1.483 0.137980
isDept11    -0.0087586  0.0024063  -3.640 0.000273 ***
isDept12     0.0005848  0.0024278   0.241 0.809655
isDept13    -0.0009918  0.0026136  -0.379 0.704326
isDept14    -0.0040186  0.0024396  -1.647 0.099518 .
isDept15     0.0281529  0.0027421  10.267  < 2e-16 ***
isDept16    -0.0087043  0.0023215  -3.750 0.000177 ***
isDept17    -0.0029626  0.0031837  -0.931 0.352083
isDept18    -0.0087586  0.0084908  -1.032 0.302288
isDept19    -0.0085678  0.0022610  -3.789 0.000151 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1149 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.08693,   Adjusted R-squared:  0.08689
F-statistic:  2297 on 19 and 458507 DF,  p-value: < 2.2e-16
```

Hide

```
summary(regression_6)
```

```
Call:
lm(formula = hasSteel ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.43917 -0.00252 -0.00153 -0.00032  0.99997

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  3.808e-04  1.977e-03   0.193  0.84729
isDept1      4.354e-03  2.176e-03   2.001  0.04538 *
isDept2     -1.982e-04  2.405e-03  -0.082  0.93434
isDept3     -3.808e-04  2.360e-03  -0.161  0.87182
isDept4      4.388e-01  2.161e-03 203.038  < 2e-16 ***
isDept5     -5.807e-05  2.177e-03  -0.027  0.97872
isDept6      2.151e-04  2.047e-03   0.105  0.91630
isDept7      2.137e-03  2.052e-03   1.041  0.29774
isDept8     -3.808e-04  2.070e-03  -0.184  0.85401
isDept9     -3.808e-04  2.754e-03  -0.138  0.89004
isDept10     1.284e-02  2.037e-03   6.302 2.95e-10 ***
isDept11    -3.808e-04  2.121e-03  -0.180  0.85754
isDept12     3.213e-03  2.140e-03   1.501  0.13334
isDept13     5.730e-04  2.304e-03   0.249  0.80361
isDept14     2.081e-02  2.151e-03   9.675  < 2e-16 ***
isDept15     7.529e-03  2.417e-03   3.114  0.00184 **
isDept16    -3.537e-04  2.047e-03  -0.173  0.86279
isDept17     7.784e-04  2.807e-03   0.277  0.78153
isDept18    -3.808e-04  7.485e-03  -0.051  0.95943
isDept19     1.151e-03  1.993e-03   0.578  0.56354
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1013 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.3471,    Adjusted R-squared:  0.3471
F-statistic: 1.283e+04 on 19 and 458507 DF,  p-value: < 2.2e-16
```

Hide

```
summary(regression_7)
```

```
Call:
lm(formula = hasZinc ~ isDept1 + isDept2 + isDept3 + isDept4 +
    isDept5 + isDept6 + isDept7 + isDept8 + isDept9 + isDept10 +
    isDept11 + isDept12 + isDept13 + isDept14 + isDept15 + isDept16 +
    isDept17 + isDept18 + isDept19, data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.00541 -0.00226 -0.00008 -0.00002  0.99998

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.194e-14  5.990e-04   0.000 1.000000
isDept1      4.013e-04  6.591e-04   0.609 0.542676
isDept2      5.479e-04  7.286e-04   0.752 0.452047
isDept3     -1.581e-14  7.150e-04   0.000 1.000000
isDept4     -3.513e-14  6.547e-04   0.000 1.000000
isDept5      8.068e-05  6.594e-04   0.122 0.902618
isDept6      5.417e-05  6.200e-04   0.087 0.930368
isDept7     -1.105e-14  6.216e-04   0.000 1.000000
isDept8      3.630e-05  6.269e-04   0.058 0.953828
isDept9     -1.291e-14  8.344e-04   0.000 1.000000
isDept10     2.348e-05  6.172e-04   0.038 0.969652
isDept11    -5.193e-15  6.426e-04   0.000 1.000000
isDept12     1.895e-03  6.484e-04   2.922 0.003473 **
isDept13     1.363e-04  6.980e-04   0.195 0.845228
isDept14     4.182e-04  6.515e-04   0.642 0.520925
isDept15     5.650e-04  7.323e-04   0.771 0.440412
isDept16    -6.942e-15  6.200e-04   0.000 1.000000
isDept17     5.410e-03  8.502e-04   6.362 1.99e-10 ***
isDept18    -8.380e-15  2.268e-03   0.000 1.000000
isDept19     2.258e-03  6.038e-04   3.740 0.000184 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.0307 on 458507 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.001292,  Adjusted R-squared:  0.00125
F-statistic: 31.21 on 19 and 458507 DF,  p-value: < 2.2e-16
```

Hide

```
summary(regression_8)
```

```
Call:
lm(formula = isDept19 ~ hasAbalone + hasAgate + hasAlloy + hasBronze +
    hasCoral + hasGlass + hasGold + hasInk + hasJade + hasLeather +
    hasLinen + hasNickel + hasPorcelain + hasSilk + hasSilver +
    hasSteel + hasWalnut + hasWatercolour + hasWood + hasZinc,
    data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.93340 -0.48263 -0.05962  0.51737  1.62898

Coefficients:
                 Estimate Std. Error  t value Pr(>|t|)
(Intercept)     0.4826285  0.0007976  605.130  < 2e-16 ***
hasAbalone     -0.0608801  0.0565741   -1.076 0.281877
hasAgate       -0.3455473  0.0165798  -20.841  < 2e-16 ***
hasAlloy       -0.1458599  0.0059347  -24.577  < 2e-16 ***
hasBronze      -0.4323556  0.0039556 -109.301  < 2e-16 ***
hasCoral       -0.0844502  0.0211857   -3.986 6.72e-05 ***
hasGlass       -0.3454408  0.0029989 -115.189  < 2e-16 ***
hasGold        -0.2610834  0.0033959  -76.883  < 2e-16 ***
hasInk          0.0285331  0.0024759   11.524  < 2e-16 ***
hasJade        -0.4210175  0.0107257  -39.253  < 2e-16 ***
hasLeather     -0.2805684  0.0053319  -52.621  < 2e-16 ***
hasLinen       -0.2880825  0.0048348  -59.585  < 2e-16 ***
hasNickel      -0.1039327  0.0267778   -3.881 0.000104 ***
hasPorcelain   -0.4619804  0.0043026 -107.372  < 2e-16 ***
hasSilk        -0.4230040  0.0024453 -172.989  < 2e-16 ***
hasSilver      -0.3476161  0.0024976 -139.182  < 2e-16 ***
hasSteel       -0.2032179  0.0052132  -38.982  < 2e-16 ***
hasWalnut      -0.3059998  0.0132287  -23.132  < 2e-16 ***
hasWatercolour  0.4222343  0.0761141    5.547 2.90e-08 ***
hasWood        -0.0799063  0.0024758  -32.275  < 2e-16 ***
hasZinc         0.4244720  0.0207126   20.493  < 2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.4304 on 458506 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.1903,    Adjusted R-squared:  0.1902
F-statistic:  5387 on 20 and 458506 DF,  p-value: < 2.2e-16
```

Hide

```
summary(regression_9)
```

```
Call:
lm(formula = isDept14 ~ hasAbalone + hasAgate + hasAlloy + hasBronze +
    hasCoral + hasGlass + hasGold + hasInk + hasJade + hasLeather +
    hasLinen + hasNickel + hasPorcelain + hasSilk + hasSilver +
    hasSteel + hasWalnut + hasWatercolour + hasWood + hasZinc,
    data = MetObjects_copy)

Residuals:
     Min       1Q   Median       3Q      Max
-0.20195 -0.03162 -0.03162 -0.03162  1.04483

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)     0.0316250  0.0003217  98.306  < 2e-16 ***
hasAbalone     -0.0139187  0.0228193  -0.610  0.54189
hasAgate       -0.0205299  0.0066875  -3.070  0.00214 **
hasAlloy       -0.0149041  0.0023938  -6.226 4.78e-10 ***
hasBronze       0.0008776  0.0015955   0.550  0.58230
hasCoral        0.0071737  0.0085453   0.839  0.40120
hasGlass        0.0161837  0.0012096  13.379  < 2e-16 ***
hasGold        -0.0199341  0.0013697 -14.553  < 2e-16 ***
hasInk          0.0297217  0.0009987  29.761  < 2e-16 ***
hasJade        -0.0283020  0.0043262  -6.542 6.08e-11 ***
hasLeather     -0.0219250  0.0021506 -10.195  < 2e-16 ***
hasLinen       -0.0104274  0.0019501  -5.347 8.95e-08 ***
hasNickel       0.1431406  0.0108009  13.253  < 2e-16 ***
hasPorcelain   -0.0035295  0.0017355  -2.034  0.04198 *
hasSilk         0.0082112  0.0009863   8.325  < 2e-16 ***
hasSilver      -0.0212350  0.0010074 -21.079  < 2e-16 ***
hasSteel        0.0271841  0.0021027  12.928  < 2e-16 ***
hasWalnut       0.0262489  0.0053358   4.919 8.69e-07 ***
hasWatercolour -0.0448497  0.0307008  -1.461  0.14405
hasWood        -0.0164436  0.0009986 -16.466  < 2e-16 ***
hasZinc        -0.0162114  0.0083545  -1.940  0.05233 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.1736 on 458506 degrees of freedom
  (298 observations deleted due to missingness)
Multiple R-squared:  0.005458,  Adjusted R-squared:  0.005414
F-statistic: 125.8 on 20 and 458506 DF,  p-value: < 2.2e-16
```