

Crash course introduction to prediction computation

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Before we start

This lab will be performed in R and will use the following packages

Add downloads

We'll be using data from tibshirani et al. that is publicly available on the gene expression omnibus (GEO) website

All course material, including the data and code used for this lab practical, is available for you to download here:

url for where to download data

Goals

- Writing code for
- Partitioning data into training and testing sets
- Fitting models in training data
- Predicting outputs from those models in the testing data
- Quantifying model prediction performance

Getting started

To start, I'll load our data into active memory and have a look at what's available:

```
load("dataset.rda")
```

```
ls()
```

```
[1] "meth" "samples"
```

So we have two data objects:

- **meth** with DNA methylation data
- **samples** with other phenotype information on the participants of this study

Let's get a better sense of the variables available in **samples**:

```
str(samples)
```

```
> 'data.frame': 464 obs. of  6 variables:
> $ gsm      : chr  "GSM1225377" "GSM1225378" "GSM1225379" "GSM1225380" ...
> $ gse      : chr  "GSE50660" "GSE50660" "GSE50660" "GSE50660" ...
> $ age      : num  50 56 49 64 51 50 47 46 50 56 ...
> $ sex      : chr  "male" "male" "female" "male" ...
```

```
> $ smoking : chr "former" "never" "former" "former" ...
> $ ever.smoke: num 1 0 1 1 1 1 1 1 1 0 ...
```

```
summary(samples)
```

```
>      gsm          gse          age          sex
> Length:464      Length:464      Min.   :38.00  Length:464
> Class :character Class :character 1st Qu.:50.00 Class :character
> Mode  :character Mode  :character Median :56.00 Mode  :character
>                                     Mean  :55.39
>                                     3rd Qu.:61.00
>                                     Max.   :67.00
>      smoking      ever.smoke
> Length:464      Min.   :0.0000
> Class :character 1st Qu.:0.0000
> Mode  :character Median :1.0000
>                                     Mean  :0.6142
>                                     3rd Qu.:1.0000
>                                     Max.   :1.0000
```

```
table(samples$smoking)
```

```
>
> current  former  never
>      22      263      179
```

```
table(samples$ever.smoke)
```

```
>
> 0  1
> 179 285
```

- Our current smoking variable has 3 categories, but we want to work with a binary outcome
- Let's do that by collapsing the **former** and **current** subjects into a single category of ever smokers

Let's add an never/ever smoking variable to our **samples** data frame:

- When I talk about predicting smoking going from now on I'll be referring to this variable