

# STA 437/2005: Methods for Multivariate Data

Week 4: Principal Component Analysis

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## PCA teaser

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## Example 1: Decathlon

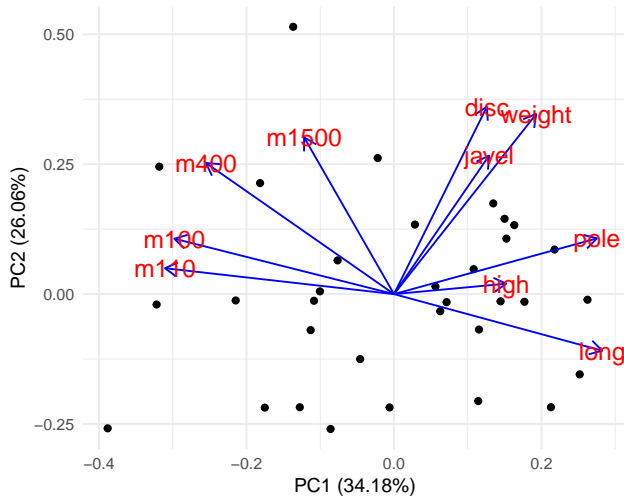
The columns are a subset of gene expression measurements, they correspond to 156 genes that show differential expression between cell types:

```
> data("olympic", package = "ade4")
> athletes = setNames(olympic$tab,
+   c("m100", "long", "weight", "high", "m400", "m110", "disc", "pole", "javel", "m1500"))
> head(athletes)
```

	m100	long	weight	high	m400	m110	disc	pole	javel	m1500
1	11.25	7.43	15.48	2.27	48.90	15.13	49.28	4.7	61.32	268.95
2	10.87	7.45	14.97	1.97	47.71	14.46	44.36	5.1	61.76	273.02
3	11.18	7.44	14.20	1.97	48.29	14.81	43.66	5.2	64.16	263.20
4	10.62	7.38	15.02	2.03	49.06	14.72	44.80	4.9	64.04	285.11
5	11.02	7.43	12.92	1.97	47.44	14.40	41.20	5.2	57.46	256.64
6	10.83	7.72	13.58	2.12	48.34	14.18	43.06	4.9	52.18	274.07

# PCA Biplot for Decathlon data

## PCA Biplot of Olympic Athletes



## Example 3: Pottery

Chemical analysis data on Romano-British pottery made in three different regions (kiln 1, kilns 2-3, and kilns 4-5):

```
> data("pottery", package = "HSAUR2")  
> head(pottery)
```

	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	MnO	BaO	kiln
1	18.8	9.52	2.00	0.79	0.40	3.20	1.01	0.077	0.015	1
2	16.9	7.33	1.65	0.84	0.40	3.05	0.99	0.067	0.018	1
3	18.2	7.64	1.82	0.77	0.40	3.07	0.98	0.087	0.014	1
4	16.9	7.29	1.56	0.76	0.40	3.05	1.00	0.063	0.019	1
5	17.8	7.24	1.83	0.92	0.43	3.12	0.93	0.061	0.019	1
6	18.8	7.45	2.06	0.87	0.25	3.26	0.98	0.072	0.017	1

Question: Do the chemical profiles of each pot suggest different types of pots and if any such types are related to kiln or region.

# PCA Biplot for Pottery data

## PCA Biplot of Olympic Athletes

