

Combining expression and CGH data on breast cancer cell lines: Neve2006

VJ Carey, package maintainer, <stvjc@channing.harvard.edu>

September 15, 2007

Contents

1	Introduction	1
2	CGH feature data	3
3	Gene expression data in relation to copy number	3

1 Introduction

The basic source information is obtainable by interrogating objects in the package.

```
> library(Neve2006)
> data(neveRMAMatch)
> neveRMAMatch
```

```
ExpressionSet (storageMode: lockedEnvironment)
assayData: 22283 features, 50 samples
  element names: exprs
phenoData
  rowNames: 600MPE, AU565, ..., ZR75B (50 total)
  varLabels and varMetadata description:
    ind: index
    cellLine: as tab 1
    ....: ...
    reductMamm: reduction mammaplasty
    (15 total)
featureData
  featureNames: 1007_s_at, 1053_at, ..., AFFX-TrpnX-M_at (22283 total)
  fvarLabels and fvarMetadata description: none
```

```

experimentData: use 'experimentData(object)'
  pubMedIds: 17157791
Annotation: hgu133a

> experimentData(neveRMAMatch)

Experiment data
  Experimenter name: Neve RM
  Laboratory: Life Sciences Division, Lawrence Berkeley National Laboratory, Berkeley,
  Contact information:
  Title: A collection of breast cancer cell lines for the study of functionally distinct
  URL:
  PMIDs: 17157791

  Abstract: A 116 word abstract is available. Use 'abstract' method.

> data(neveCGHmatch)
> neveCGHmatch

cghSet (storageMode: lockedEnvironment)
assayData: 2696 features, 50 samples
  element names: exprs
phenoData
  rowNames: 600MPE, AU565, ..., ZR75B (50 total)
  varLabels and varMetadata description:
    ind: index
    cellLine: as tab 1
    ...: ...
    reductMamm: reduction mammoplasty
    (15 total)
featureData
  featureNames: RP11-82D16, RP11-62M23, ..., RP11-247J14 (2696 total)
  fvarLabels and fvarMetadata description:
    Clone: clone ID
    Chrom: chromosome number
    kb: kilobase on chromosome
    kbGenome: kilobase along genome
experimentData: use 'experimentData(object)'
  pubMedIds: 17157791
Annotation: Neve2006.caArrayDB

> all.equal(sampleNames(neveRMAMatch), sampleNames(neveCGHmatch))

[1] TRUE

```

We can see that there are 50 arrays from the U133A platform and 50 CGH samples, and the sample names match. The PMID for the primary manuscript is provided; additional information on URLs where the base data can be found should be added.

2 CGH feature data

Let's look at metadata provided on the first five clones in the CGH platform:

```
> featureData(neveCGHmatch)[1:5, ]
```

An object of class "AnnotatedDataFrame"

rowNames: RP11-82D16, RP11-62M23, ..., RP11-51B4 (5 total)

varLabels and varMetadata description:

Clone: clone ID

Chrom: chromosome number

kb: kilobase on chromosome

kbGenome: kilobase along genome

The genomic location of clone sequence is tied completely to the build of the genome used to compute the location. This information is not provided in the data sources. We know from the paper that scanning and OncoBAC arrays were used, but no information about the details of annotation are immediately available.

Figure 5 of the main paper associates clone RP11-265K5 with a number of genes, including PROSC and BRF2. Let's see where this clone lives:

```
> pData(featureData(neveCGHmatch))[grep("RP11-265K5", featureNames(neveCGHmatch)),
+ ]
```

	Clone	Chrom	kb	kbGenome
RP11-265K5	RP11-265K5	8	38125.49	1429440

If we use Map Viewer at NCBI for Homo sapiens build 36.2, we find this clone located at about 37180K, in the vicinity of genes WHSC1L1, LETM2, FGFR1, PPADPC1B, DDHD2, BAG4, LSM1, STAR, ASH2L. Some of these are noted in Figure 5. The cytoband is 8p12.

3 Gene expression data in relation to copy number

Let's identify probe sets annotated to 8p12.

```
> library(hgu133a)
> library(annotate)
> cb = as.list(hgu133aMAP)
```

```

> G8p12ind = grep("8p12", unlist(cb))
> ps8p12 = names(unlist(cb)[G8p12ind])
> nevex = exprs(neveRMAMatch)[ps8p12, ]
> syms = as.character(unlist(lookUp(rownames(nevex), "hgu133a",
+   "SYMBOL"))))

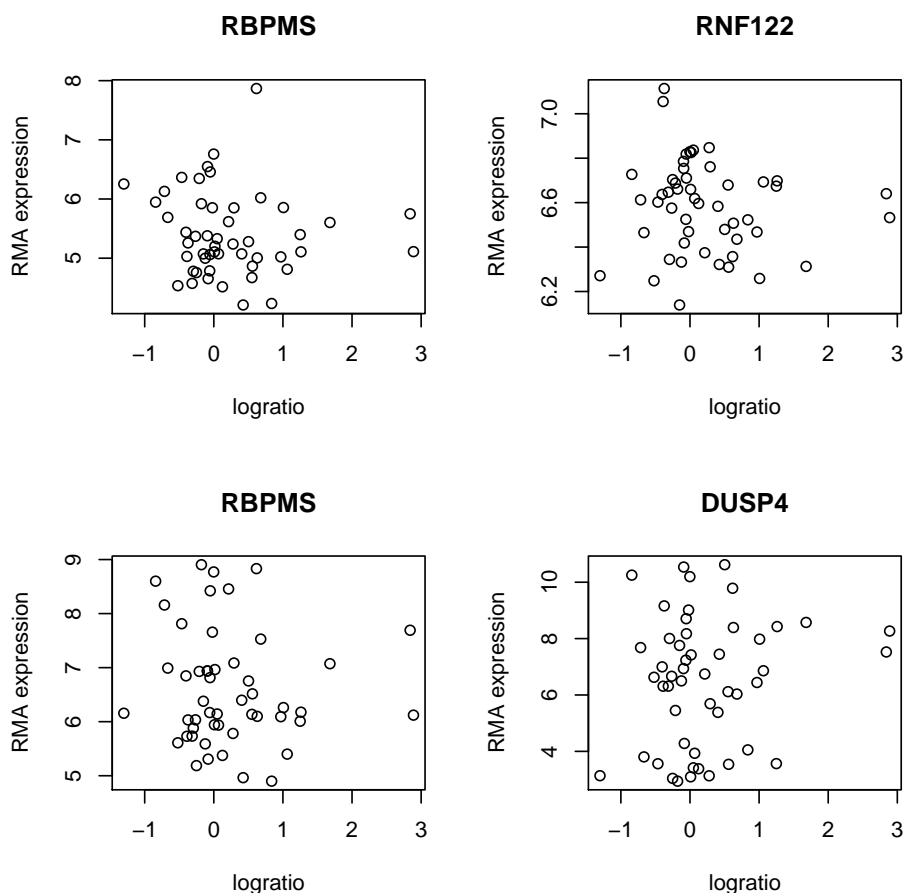
```

The logratios that measure copy number will be used 'raw'.

```

> nevlr = as.numeric(logRatios(neveCGHmatch)["RP11-265K5", ])
> par(mfrow = c(2, 2))
> for (i in c(2, 8, 11, 20)) plot(nevlr, nevex[i, ], xlab = "logratio",
+   ylab = "RMA expression", main = syms[i])
> par(mfrow = c(1, 1))

```



Also of interest is the expression distribution for SFRP1.

Connection of these associations to phenotype is straightforward with proper use of phenoData components of the ExpressionSet and cghSet objects. A unified representation of the two assays that includes support for linking clone and probe set is in development.