

GGBase: infrastructure for genetics of gene expression

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May 21, 2008

1 Introduction

Data representations for genetics of gene expression in humans must be as efficient as possible. Up to Bioconductor 2.1, integrative genomics experiments could be represented by `racExSet` instances as defined in package `GGtools`. Genotypes were represented as integers.

For Bioconductor 2.2, we have access to the `snpMatrix` package of D. Clayton, and we have introduced the `smlSet` class to represent genetics of gene expression studies with lists of `snp.matrix` instances, along with ordinary representations of expression data.

2 Primary class structure, and associated methods

```
> library(GGBase)
> getClass("smlSet")
```

Slots:

Name:	smlEnv	snpLocPathMaker	chromInds
Class:	environment	function	numeric

Name:	organism	snpLocPackage	snpLocRef
Class:	character	character	character

Name:	activeSnpInds	assayData	phenoData
Class:	numeric	AssayData	AnnotatedDataFrame

Name:	featureData	experimentData	annotation
Class:	AnnotatedDataFrame	MIAME	character

Name:	.__classVersion__
Class:	Versions

Extends:

Class "eSet", directly

Class "VersionedBiobase", by class "eSet", distance 2

Class "Versioned", by class "eSet", distance 3

```
> library(GGtools)
```

```
> showMethods(class = "smlSet")
```

Function: [(package base)

x="smlSet", i="ANY", j="ANY"

Function: exprs (package Biobase)

object="smlSet"

Function: getAlleles (package GGtools)

x="smlSet", rs="rsNum"

Function: getSnpChroms (package GGtools)

x="smlSet", filterActive="logical"

x="smlSet", filterActive="missing"

Function: getSnpLocs (package GGtools)

x="smlSet", filterActive="logical"

x="smlSet", filterActive="missing"

Function: gwSnpScreen (package GGtools)

sym="GeneSet", sms="smlSet", cnum="cnumOrMissing"

sym="genesym", sms="smlSet", cnum="cnumOrMissing"

Function: nsamp (package GGtools)

x="smlSet"

Function: plot_EvG (package GGtools)

gsym="genesym", rsn="rsNum", sms="smlSet"

Function: rawSNP (package GGtools)

x="smlSet", chrind="numeric"

Function: sampleNames (package Biobase)

object="smlSet"

Function: show (package methods)

```
object="smlSet"
```

```
Function: smlEnv (package GGBase)  
x="smlSet"
```

```
Function: smList (package GGBase)  
x="smlSet"
```

```
Function: snps (package GGtools)  
x="smlSet", chr="chrnum"
```

3 Example data structure

```
> data(hmceuB36.2021)
```

```
> hmceuB36.2021
```

```
snp.matrix-based genotype set:
```

```
number of samples: 90
```

```
number of snp.matrix: 2
```

```
annotation:
```

```
  exprs: illuminaHumanv1.db
```

```
  snps: snp locs package: GGBase ; SQLite ref: hmceuAmbB36_23a_dbconn
```

```
Expression data: 47293 x 90
```

```
Phenodata: An object of class "AnnotatedDataFrame"
```

```
  sampleNames: NA06985, NA06991, ..., NA12892 (90 total)
```

```
  varLabels and varMetadata description:
```

```
    famid: hapmap family id
```

```
    persid: hapmap person id
```

```
    ...: ...
```

```
    isAdad: logical TRUE if person is a father
```

```
    (9 total)
```

4 SNP location infrastructure

We have decided to use a dynamically exported SQLite connection to provide access to SNP location information.

```
> conn = grep("dbconn", objects("package:GGBase"), value = TRUE)
```

```
> dbListTables(get(conn)())
```

```
[1] "hmceuAmbB36_23a"
```

5 Conclusion

The concepts discussed above define the bulk of the tools supporting the `gwSnpScreen` method of `GGtools`. Consult the vignette of `GGtools` for more information.