Good software: simple, tidy, rich

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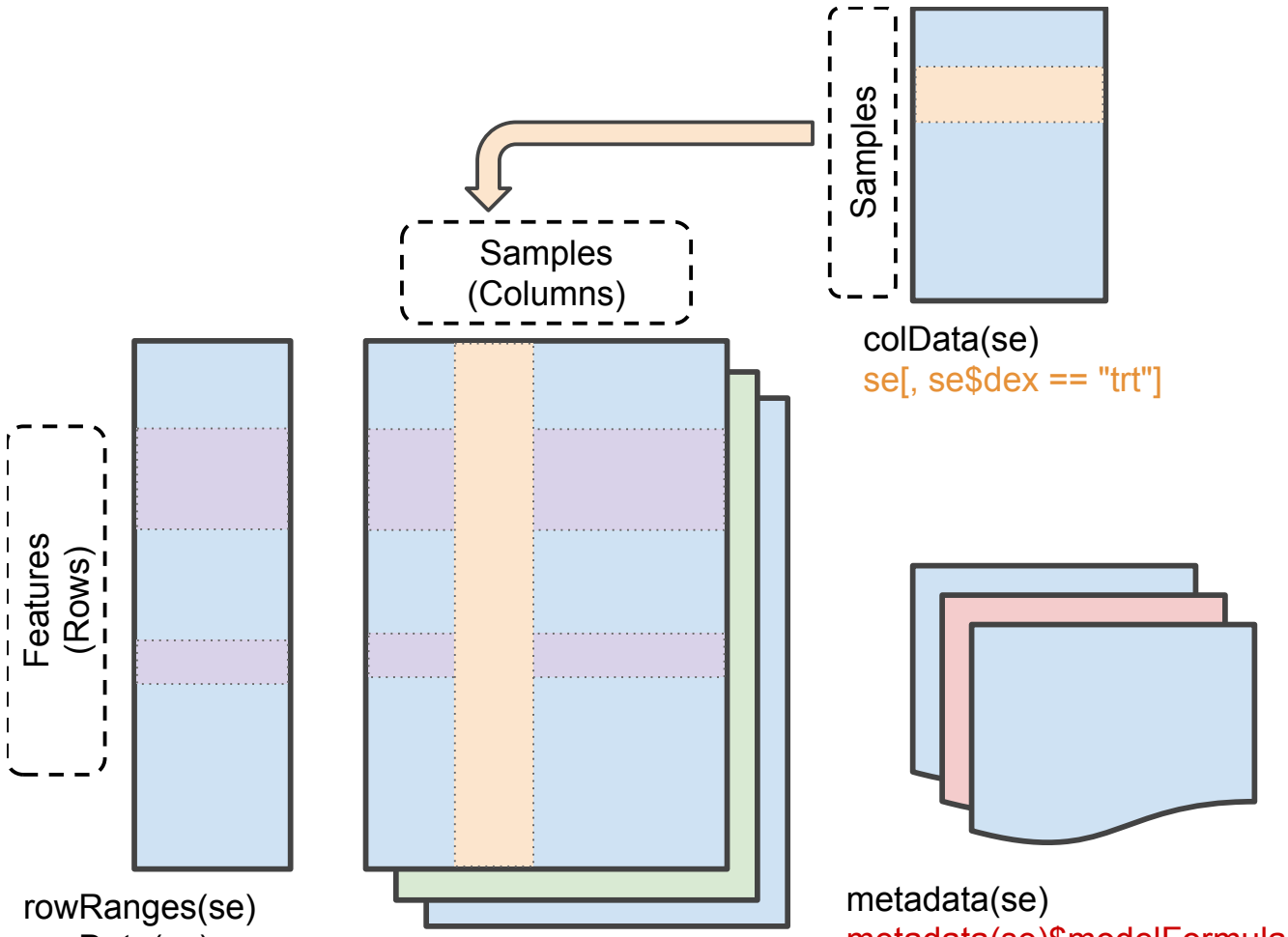
R / Bioconductor

`https://bioconductor.org`
`https://support.bioconductor.org`

1. Statistical analysis and comprehension of high-throughput genomic data.
2. Open – public version control
3. Reproducibile research – vignettes, 'experiment data' packages, release / devel branches, ...
4. Interoperable – package re-use, data structures, ...
5. Usable – documentation, support, ...


Samples
Samples
(Columns)
colData(se)
se[, se$dex == "trt"]
Features
(Rows)
rowRanges(se)
rowData(se)
subsetByOverlaps(se, roi)
assays(se)
assay(se, n = 2)
assay(subsetByOverlaps(se, roi))
assay(se[, se$dex == "trt"])
metadata(se)
metadata(se)$modelFormula

Simple, tidy, rich: RNA-seq count data

Vocabulary

- Simple: extensive
- Tidy: restricted endomorphisms
- Rich: extensive, meaningful

Constraints (e.g., probes & samples)

- Tidy: implicit
- Simple, Rich: explicit

Flexibility

- Simple, tidy: general-purpose
- Rich: specialized

Programming contract

- Simple, tidy: limited
- Rich: strict

Lessons learned / best practices

- Considerable value in semantically rich structures
- Current implementations trade-off user and developer convenience
- Endomorphism, simple vocabulary, consistent paradigm aid use

Pretty big data

- E.g., single-cell RNA-seq, 30,000 genes by 1.3 million samples.
- On-disk representation in hdf5.
- Convenient in-memory 'matrix' abstraction for subsetting, etc.; easy input of manageable subset.
- `https://github.com/mtmorgan/TENxGenomics`

```
> basename(fl)
[1] "1M_neurons_filtered_gene_bc_matrices_h5.h5"
> (tenx <- TENxGenomics(fl))
class: TENxGenomics
h5path: ./1M_neurons_filtered_gene_bc_matrices_h5.h5
dim(): 27998 x 1306127
> tenk <- tenx[, sample(ncol(tenx), 10000)] ## fast
> m <- as.matrix(tenk)                      ## manageable
> se = SummarizedExperiment(list(tenx))     ## rich
```

Opportunities

Programmer analysts

- `https://roswellpark.org/careers`
- Programmer / Analyst – *R* software development 4924
- Senior Programmer Analyst – cloud / new-age sys. admin 4932

Bioconductor annual conference

- Boston, July 26 (D-day) – 28.
- `https://bioconductor.org/BioC2017`

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