
Index

- A**
- ANOVA, 68, 81, 85
 - Anscomb's quartet, 72–73
 - Array, 98
 - Assignment, coding, 97
- B**
- Bit depth, imaging data, 23
- C**
- CCA. *See* Connected component analysis
 - CI. *See* Confidence interval
 - Coding
 - array, 98
 - assignment, 97
 - benefits, 92
 - command line mastering, 92–96
 - debugging, 112–113
 - getting started, 91, 96–97
 - help resources, 113–114
 - ImageJ macro
 - all files in a directory, 102–106
 - creation, 101–102
 - loop, 98–101
 - modular code, 115
 - operator, 101
 - principles, 91–92
 - readability improvement, 114–115
 - script for automated image analysis, 106–109
 - sharing code, 117–118
 - string, 97
 - validation, 109–112
 - variable, 97
 - vector, 98
 - version control, 115–117
 - Command line. *See* Coding
 - Confidence interval (CI), 70
 - Connected component analysis (CCA), 40
 - Contrast stretching, images, 31
 - Convolution, images, 42–43
- D**
- Data organization
 - backup, 16–17
 - databases for resources, 11
 - electronic lab notebook, 12–14
 - Excel, 3
 - experiment-based organization, 8–10
 - sharing, 16
 - Digital object identifier (DOI), 115–116
 - DOI. *See* Digital object identifier
 - Downsampling, images, 29
 - Drift, images, 33–34
 - Dunnett's test, 81–82
 - Dunn–Holland–Wolfe test, 84
 - Dynamic range, imaging, 35
- E**
- Effect size, 88–89
 - Electronic lab notebook (ELN), 12–14
 - ELN. *See* Electronic lab notebook
 - Error types, 66
 - Excel
 - advantages and disadvantages, 2–3
 - data organization for digital cell, 3
- F**
- False discovery rate (FDR), 87
 - FDR. *See* False discovery rate
 - Figures
 - best practice, 122–123
 - color blindness concerns, 125
 - contrast adjustment, 125–126
 - cropping, 126

Figures (*Continued*)

- examples, 124
- formats, 123, 125
- movie files, 127
- scale bars, 126–127
- sizing, 123, 125
- unacceptable manipulation, 127–128

Fiji. *See* ImageJ

Filters, images, 42–44

Fluorophore, selection for imaging, 34–35

Focus, images, 33–34

Forking, code, 117

G

Gamma, images, 32

Gaussian function, 69

Gel densitometry, 44–47

git, 115–116

GitHub, 116–118

Golden rules

- coding, 118
- data organization, 17
- digital cell biologists, 4–5
- experimental design, 65
- figure generation, 128
- image analysis, 59
- imaging, 36
- statistical analysis, 89

H

Hyperstack, image, 26

I

IDR. *See* Image Data Resource

Image analysis

- automation, 57–58, 106–109
- cell protein quantification, 38–39
- filters, 42–44
- gel densitometry, 44–47
- movies
 - kymographs, 51–53
 - overview, 48
 - particle tracking, 48–51
 - subcellular localization, 53–57
 - vesicle counting tutorial, 48
- overview, 37–38
- segmentation, 40–42
- validation, 58

Image Data Resource (IDR), 16

ImageJ, 20, 24, 101–106

Imaging data

- databases, 13, 15–16
- features, 21–23
- formats, 24
- image criteria and trade-offs, 33
- information content, 32–33
- metadata, 27–28
- multidimensional files, 25–26
- processing. *See* Image analysis
- software, 19–21
- transformation, 29–32
- types in Fiji, 24–25

Interquartile range (IQR), 68, 70, 86

Inversion, images, 29, 31

IQR. *See* Interquartile range

K

Kolmogorov–Smirnov test, 79

Kruskal–Wallis test, 68, 83

Kymograph

- generation, 51–52
- manipulation, 52–53
- overview, 51

L

Linear regression, 68

Logistic regression, 68

Loop, 98–101

M

Macro. *See* Coding

MAD. *See* Median absolute deviation

Manders' coefficient, 54–55

Mann–Whitney test, 68, 78

Mean, 68, 70

Median, 68, 70

Median absolute deviation (MAD), 70

Movie

- files for publication, 127
- kymograph, 51–53
- overview, 48
- particle tracking, 48–51
- subcellular localization, 53–57
- vesicle counting tutorial, 48

- N**
- n*, 62–65
 - Nonparametric regression, 68
 - Normalization, data, 85–87
 - Null hypothesis, 66
- O**
- OME. *See* Open Microscopy Environment
 - OMERO. *See* Open Microscopy Environment Remote Objects
 - Open Microscopy Environment (OME), 13
 - Open Microscopy Environment Remote Objects (OMERO), 13, 15–16, 28, 122
 - Operator, 101
- P**
- Particle tracking, 48–51
 - PCC. *See* Pearson’s correlation coefficient
 - Pearson’s correlation coefficient (PCC), 54–55, 68
 - Photobleaching, 34
 - Phototoxicity, 34
 - Pipeline, digital cell, 1–2
 - Plotting, data, 71–75, 119–122
 - Power analysis, 65–67
 - p*-value
 - effect size, 88–89
 - overview, 87
 - statistically significant versus biologically significant, 87–88
- Q**
- QQ plot. *See* Quantile–quantile plot
 - Quantile–quantile (QQ) plot, 72, 75, 79
- R**
- R. *See* Coding
 - Range, 70
 - Region of interest (ROI), 37–38, 41, 47–48, 126
 - ROI. *See* Region of interest
 - Rstudio, 20–21
- S**
- Scale bar, figure, 126–127
 - Segmentation, images, 40–42
 - SEM. *See* Standard error of the mean
 - Software. *See also specific programs*
 - imaging data, 19–21
 - overview, 4
 - table, 129
 - Spearman’s rank correlation coefficient (SRCC), 54–56, 68
 - SRCC. *See* Spearman’s rank correlation coefficient
 - Standard deviation, 68, 70
 - Standard error of the mean (SEM), 70
 - Statistics
 - comparison testing
 - complicated experimental designs, 85
 - one group to a value, 76
 - three or more groups, 81–84
 - two groups, 76–81
 - data normalization and standardization, 85–87
 - effect size, 88–89
 - experimental design, 61–62
 - n*, 62–65
 - plotting data, 71–75
 - power analysis, 65–67
 - p*-value, 87–89
 - recommended tests by data types, 67–69, 71
 - statistically significant versus biologically significant, 87–88
 - summary statistics, 70–71
 - String, 97
 - Subcellular localization, 53–57
- T**
- t*-test, 68, 76–78, 83
 - Tukey’s HSD test, 82
- V**
- Variable, 97
 - Vector, 98
- W**
- Western blot, gel densitometry, 44–47
 - Wilcoxon test, 68, 78
 - Workflow
 - coding, 91–92
 - digital cell, 1–2