Mathematics for Machine Learning

The mathematics behind the machine learning:

There are many reasons why the mathematics of Machine Learning is important and I will highlight some of them below:

1. Selecting the right algorithm which includes giving considerations to accuracy, training time, model complexity, number of parameters and number of features.
2. Choosing parameter settings and validation strategies.
3. Identifying underfitting and overfitting by understanding the Bias-Variance tradeoff.
4. Estimating the right confidence interval and uncertainty.

What Level of Maths Do You Need?

1. **Linear Algebra**:
   In ML, Linear Algebra comes up everywhere. Topics such as Principal Component Analysis (PCA), Singular Value Decomposition (SVD), Eigendecomposition of a matrix, LU Decomposition, QR Decomposition/Factorization, Symmetric Matrices, Orthogonalization & Orthonormalization, Matrix Operations, Projections, Eigenvalues & Eigenvectors, Vector Spaces and Norms are needed for understanding the optimization methods used for machine learning

2. **Multivariate Calculus**:
   Some of the necessary topics include Differential and Integral Calculus, Partial Derivatives, Vector-Values Functions, Directional Gradient, Hessian, Jacobian, Laplacian and Lagragian Distribution.