NumPy Cheat Sheet

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| Operation | Description | Code Example |
| Creating Arrays | Create a NumPy array. | arr = np.array([1, 2, 3, 4]) |
| Array Shape | Get the shape of an array. | arr.shape |
| Array Size | Get the total number of elements. | arr.size |
| Array Reshaping | Reshape an array. | arr.reshape(2, 2) |
| Array Transpose | Transpose the array. | arr.T |
| Array Dimension | Get the number of dimensions. | arr.ndim |
| Array Data Type | Get the data type of the array. | arr.dtype |
| Array Indexing | Access elements by index. | arr[2] |
| Array Slicing | Slice a portion of the array. | arr[1:3] |
| Element-wise Operations | Element-wise addition. | arr + 1 |
| Element-wise multiplication | Element-wise multiplication. | arr \* 2 |
| Array Concatenation | Concatenate two arrays. | np.concatenate([arr1, arr2]) |
| Array Stacking | Stack arrays vertically. | np.vstack([arr1, arr2]) |
| Array Stacking | Stack arrays horizontally. | np.hstack([arr1, arr2]) |
| Array Sorting | Sort an array. | np.sort(arr) |
| Array Sum | Sum all elements. | np.sum(arr) |
| Array Mean | Compute mean of array. | np.mean(arr) |
| Array Standard Deviation | Compute standard deviation. | np.std(arr) |
| Array Max | Find the maximum value. | np.max(arr) |
| Array Min | Find the minimum value. | np.min(arr) |
| Matrix Multiplication | Perform matrix multiplication. | np.dot(arr1, arr2) |
| Element-wise Power | Raise each element to a power. | np.power(arr, 2) |
| Sum of Elements by Axis | Sum along a specific axis. | np.sum(arr, axis=0) |
| Array Broadcasting | Perform operations on arrays with different shapes. | arr1 + arr2 (if compatible shapes) |
| Creating Zeros | Create an array of zeros. | np.zeros((3, 3)) |
| Creating Ones | Create an array of ones. | np.ones((2, 4)) |
| Identity Matrix | Create an identity matrix. | np.eye(3) |
| Array with Random Values | Create an array with random values. | np.random.rand(2, 2) |
| Array with Random Integers | Create an array with random integers. | np.random.randint(0, 10, (2, 2)) |
| Array Element Wise Comparison | Compare elements of arrays. | arr1 == arr2 |
| Array Logical Operations | Perform logical operations. | np.logical\_and(arr1 > 2, arr2 < 5) |
| Array Unique | Find unique elements in an array. | np.unique(arr) |
| Array Flatten | Flatten a multi-dimensional array. | arr.flatten() |
| Array to List | Convert array to a list. | arr.tolist() |
| Array Clip | Clip values exceeding a range. | np.clip(arr, 1, 10) |
| Element-wise Exponentiation | Compute the exponent of each element. | np.exp(arr) |
| Element-wise Logarithm | Compute the natural logarithm of each element. | np.log(arr) |
| Dot Product | Compute the dot product of two arrays. | np.dot(arr1, arr2) |
| Cross Product | Compute the cross product of two vectors. | np.cross(arr1, arr2) |
| Array Intersections | Find common elements between two arrays. | np.intersect1d(arr1, arr2) |
| Array Set Difference | Find elements in the first array but not in the second. | np.setdiff1d(arr1, arr2) |
| Array Set Union | Find the union of two arrays. | np.union1d(arr1, arr2) |
| Array Set Symmetric Difference | Find elements in either array but not both. | np.setxor1d(arr1, arr2) |
| Array Sorting (Indices) | Get indices that would sort the array. | np.argsort(arr) |
| Array Cumsum | Compute the cumulative sum of the array. | np.cumsum(arr) |
| Array Cumprod | Compute the cumulative product of the array. | np.cumprod(arr) |
| Array All | Check if all elements satisfy a condition. | np.all(arr > 0) |
| Array Any | Check if any element satisfies a condition. | np.any(arr > 5) |
| Array Diagonal | Get the diagonal elements of a 2D array. | np.diagonal(arr) |
| Array Diagonal Set | Set the diagonal elements of a 2D array. | np.fill\_diagonal(arr, value) |
| Array Meshgrid | Create coordinate matrices from coordinate vectors. | np.meshgrid(arr1, arr2) |
| Array Covariance | Compute the covariance matrix. | np.cov(arr1, arr2) |
| Array Correlation | Compute the correlation coefficient. | np.corrcoef(arr1, arr2) |
| Array Rank | Compute the rank of the array. | np.linalg.matrix\_rank(arr) |
| Matrix Determinant | Compute the determinant of a matrix. | np.linalg.det(arr) |
| Matrix Inverse | Compute the inverse of a matrix. | np.linalg.inv(arr) |
| Eigenvalues and Eigenvectors | Compute the eigenvalues and eigenvectors of a matrix. | np.linalg.eig(arr) |
| Matrix Eigenvalues | Compute the eigenvalues of a matrix. | np.linalg.eigvals(arr) |
| Singular Value Decomposition | Compute the SVD of a matrix. | np.linalg.svd(arr) |
| LU Decomposition | Perform LU decomposition of a matrix. | from scipy.linalg import lu; P, L, U = lu(arr) |
| Matrix Trace | Compute the trace of a matrix. | np.trace(arr) |
| Solve Linear System | Solve a system of linear equations. | np.linalg.solve(A, b) |
| Least Squares Solution | Solve using least squares method. | np.linalg.lstsq(A, b, rcond=None) |
| Matrix Norm | Compute the norm of a matrix. | np.linalg.norm(arr) |
| Matrix Condition Number | Compute the condition number of a matrix. | np.linalg.cond(arr) |
| Matrix Eigenvectors | Compute the eigenvectors of a matrix. | np.linalg.eig(arr)[1] |
| QR Decomposition | Perform QR decomposition of a matrix. | np.linalg.qr(arr) |
| Matrix Rank (Full) | Check if a matrix has full rank. | np.linalg.matrix\_rank(arr) == min(arr.shape) |
| Fast Fourier Transform (FFT) | Compute the 1D FFT of an array. | np.fft.fft(arr) |
| Inverse Fast Fourier Transform (IFFT) | Compute the inverse 1D FFT of an array. | np.fft.ifft(arr) |
| 2D Fast Fourier Transform | Compute the 2D FFT of an array. | np.fft.fft2(arr) |
| Inverse 2D FFT | Compute the inverse 2D FFT of an array. | np.fft.ifft2(arr) |
| FFT Shift | Shift zero frequency component to the center. | np.fft.fftshift(arr) |
| Rounding Operations | Round elements to nearest integer. | np.round(arr) |
| Floor | Round elements down to nearest integer. | np.floor(arr) |
| Ceiling | Round elements up to nearest integer. | np.ceil(arr) |
| Fractional Part | Extract the fractional part of each element. | np.modf(arr) |