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Numpy

CheatSheet

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Array Creation

- **np.array([1, 2, 3]):** Create a 1D array from a list.
- **np.zeros((3, 3)):** Create a 3x3 array filled with zeros.
- **np.ones((2, 2)):** Create a 2x2 array filled with ones.
- **np.arange(0, 10, 2):** Generate values from 0 to 10 with a step of 2.
- **np.random.rand(3, 3):** Generate a 3x3 array of random values between 0 & 1.
- **np.eye(4):** Create a 4x4 identity matrix.
- **np.full((2, 2), 7):** Create a 2x2 array filled with the value 7.
- **np.linspace(0, 10, 5):** Create 5 equally spaced values between 0 and 10.

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Array Manipulation

- **arr.reshape((rows, cols)):** Reshape an array into the specified dimensions.
- **arr.flatten():** Convert a multi- dimensional array into a 1D array.
- **np.concatenate([arr1, arr2], axis=0):** Concatenate arrays along a specific axis.
- **arr.T:** Transpose the array (swap rows and columns).
- **np.vstack([arr1, arr2]):** Stack arrays vertically.
- **np.hstack([arr1, arr2]):** Stack arrays horizontally.
- **np.expand_dims(arr, axis=0):** Add a new dimension to the array.
- **arr.swapaxes(0, 1):** Swap the first and second axes of an array.

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Indexing & Filtering

- **arr[1, 2]:** Access an element at row 1 and column 2.
- **arr[1, :]:** Select all columns from row 1.
- **arr[arr > 5]:** Filter elements greater than 5.
- **np.where(arr > 5, 1, 0):** Replace elements based on a condition.
- **np.nonzero(arr):** Get the indices of non-zero elements.
- **arr[0:2, :] = 10:** Set the first two rows to 10.
- **arr[:, 1:3]:** Slice columns from index 1 to 3.
- **arr[arr % 2 == 0]:** Select even elements in the array.

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Statistics

- **np.mean(arr):** Compute the mean of the array.
- **np.median(arr):** Compute the median of the array.
- **np.std(arr):** Compute the standard deviation of the array.
- **np.sum(arr):** Calculate the total sum of all elements.
- **np.min(arr), np.max(arr):** Find the minimum and maximum values.
- **np.percentile(arr, 50):** Compute the 50th percentile.
- **np.var(arr):** Compute the variance of the array.
- **np.corrcoef(arr1, arr2):** Calculate the correlation coefficient between two arrays.

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Linear Algebra

- **np.dot(arr1, arr2):** Perform the dot product of two arrays.
- **arr1 @ arr2:** Perform matrix multiplication.
- **arr.T:** Compute the transpose of the array.
- **np.linalg.inv(arr):** Compute the inverse of a square matrix.
- **np.linalg.det(arr):** Compute the determinant of a matrix.
- **np.linalg.eig(arr):** Find the eigenvalues and eigenvectors.
- **np.linalg.svd(arr):** Compute the Singular Value Decomposition of a matrix.
- **np.linalg.norm(arr):** Compute the Frobenius norm of a matrix.

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Data Handling

- **np.unique(arr):** Return the unique elements of the array.
- **np.sort(arr):** Sort the array elements in ascending order.
- **np.argsort(arr):** Return the indices that would sort the array.
- **np.count_nonzero(arr):** Count the number of non-zero elements.
- **np.nan_to_num(arr):** Replace NaN values with zero or specified value.
- **np.isnan(arr):** Identify which elements are NaN.
- **np.delete(arr, 2):** Delete the element at index 2.
- **np.insert(arr, 1, 10):** Insert the value 10 at index 1.

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Saving & Loading

- **np.save('file.npy', arr):** Save an array to a binary file.
- **np.load('file.npy'):** Load an array from a binary file.
- **np.savetxt('file.txt', arr):** Save an array to a text file.
- **np.loadtxt('file.txt'):** Load an array from a text file.
- **np.savez('file.npz', arr1=arr1, arr2=arr2):** Save multiple arrays in one file.
- **np.load('file.npz'):** Load multiple arrays from a .npz file.
- **np.savez_compressed('file.npz', arr=arr):** Save arrays in compressed .npz format.
- **np.loadtxt('file.txt', delimiter=','):** Load an array from a CSV file.

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