

1 Einops

Reference: <https://github.com/arogozhnikov/einops>

1.1 Features

- self-documenting notation for layouts of input and output arrays
- low number of backend functions to implement
- focus on data rearrangements and simple transformations (axes reordering, decomposition, composition, reduction, repeats)
- focus on 1 tensor/array transformations
- notation uses strings
- supported notations: named axis, anonymous axis, unitary axis, ellipsis, (de)compose parenthesis
- supports a list of arrays as input with implied additional outer dimension corresponding to the list
- inferrable dimension sizes, given partial info as parameters
- hide backend framework inconsistency of notations for common array rearrangement operations
- use of proxy classes for specific backends
- caching of tensor type map to backend type for performance
- caching of patterns and axes
- caching of patterns, axes, and input shape: compute unknown axis sizes and shape verification on first time, otherwise reuse sequence of commands previously generated
- inverse transformations are easy to read off by switching patterns for input and output

1.2 Approaches

- evidence based for API design, via real world use cases
- explicit separation of a few functions over 1 function, for better error messages
- consideration of adoption friction and ease of use

1.3 Known Issues

- does not enforce axes alignment between operations
- no means of integrated analysis/tracking of shapes