tf.matrix_solve_ls

Aliases:

- `tf.linalg.lstsq`
- `tf.matrix_solve_ls`

```
matrix_solve_ls(
    matrix,
    rhs,
    l2_regularizer=0.0,
    fast=True,
    name=None
)
```

Defined in `tensorflow/python/ops/linalg_ops.py`.

See the guide: Math > Matrix Math Functions

Solves one or more linear least-squares problems.

`matrix` is a tensor of shape `[..., M, N]` whose inner-most 2 dimensions form `M`-by-`N` matrices. Rhs is a tensor of shape `[..., M, K]` whose inner-most 2 dimensions form `M`-by-`K` matrices. The computed output is a `Tensor` of shape `[..., N, K]` whose inner-most 2 dimensions form `M`-by-`K` matrices that solve the equations `matrix[..., :, :] * output[..., :, :] = rhs[..., :, :]` in the least squares sense.

Below we will use the following notation for each pair of matrix and right-hand sides in the batch:

`matrix`$=A \in {}^{m\times n}$, `rhs`$=B \in {}^{m\times k}$, `output`$=X \in {}^{n\times k}$, `l2_regularizer`$=\lambda$.

If `fast` is `True`, then the solution is computed by solving the normal equations using Cholesky decomposition. Specifically, if $m \ge n$ then $X = (A^T A + \lambda I)^{-1} A^T B$, which solves the least-squares problem \(X = \mathrm{argmin}{Z \in \Re^{n \times k}} ||A Z - B||_F^2 + \lambda ||Z||_F^2\). If $m < n$ then `output` is computed as $X = A^T (A A^T + \lambda I)^{-1} B$, which (for $\lambda = 0$) is the minimum-norm solution to the under-determined linear system, i.e. \(X = \mathrm{argmin}{Z \in \Re^{n \times k}} ||Z||_F^2 \), subject to $AZ = B$. Notice that the fast path is only numerically stable when A is numerically full rank and has a condition number \(\mathrm{cond} (A) \lt \frac{1}{\sqrt{\epsilon_{\mathrm{mach}}}}\) or λ is sufficiently large.

If `fast` is `False` an algorithm based on the numerically robust complete orthogonal decomposition is used. This computes the minimum-norm least-squares solution, even when A is rank deficient. This path is typically 6-7 times slower than the fast path. If `fast` is `False` then `l2_regularizer` is ignored.

Args:

- `matrix`: `Tensor` of shape `[..., M, N]`.
- `rhs`: `Tensor` of shape `[..., M, K]`.
- `l2_regularizer`: 0-D `double` `Tensor`. Ignored if `fast=False`.
- `fast`: bool. Defaults to `True`.

- `name`: string, optional name of the operation.

Returns:

- `output`: `Tensor` of shape `[..., N, K]` whose inner-most 2 dimensions form `M`-by-`K` matrices that solve the equations `matrix[..., :, :] * output[..., :, :] = rhs[..., :, :]` in the least squares sense.

Raises:

- `NotImplementedError`: matrix_solve_ls is currently disabled for complex128 and l2_regularizer != 0 due to poor accuracy.

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