

## tf.contrib.distributions.matrix\_diag\_transform

```
matrix_diag_transform(  
    matrix,  
    transform=None,  
    name=None  
)
```

Defined in [tensorflow/python/ops/distributions/util.py](#).

See the guide: [Statistical Distributions \(contrib\)](#) > [Multivariate distributions](#)

Transform diagonal of [batch-]matrix, leave rest of matrix unchanged.

Create a trainable covariance defined by a Cholesky factor:

```
# Transform network layer into 2 x 2 array.  
matrix_values = tf.contrib.layers.fully_connected(activations, 4)  
matrix = tf.reshape(matrix_values, (batch_size, 2, 2))  
  
# Make the diagonal positive. If the upper triangle was zero, this would be a  
# valid Cholesky factor.  
chol = matrix_diag_transform(matrix, transform=tf.nn.softplus)  
  
# LinearOperatorTriL ignores the upper triangle.  
operator = LinearOperatorTriL(chol)
```

Example of heteroskedastic 2-D linear regression.

```
# Get a trainable Cholesky factor.  
matrix_values = tf.contrib.layers.fully_connected(activations, 4)  
matrix = tf.reshape(matrix_values, (batch_size, 2, 2))  
chol = matrix_diag_transform(matrix, transform=tf.nn.softplus)  
  
# Get a trainable mean.  
mu = tf.contrib.layers.fully_connected(activations, 2)  
  
# This is a fully trainable multivariate normal!  
dist = tf.contrib.distributions.MVNCholesky(mu, chol)  
  
# Standard log loss. Minimizing this will "train" mu and chol, and then dist  
# will be a distribution predicting labels as multivariate Gaussians.  
loss = -1 * tf.reduce_mean(dist.log_prob(labels))
```

Args:

- **matrix**: Rank **R Tensor**, **R >= 2**, where the last two dimensions are equal.
- **transform**: Element-wise function mapping **Tensors** to **Tensors**. To be applied to the diagonal of **matrix**. If **None**, **matrix** is returned unchanged. Defaults to **None**.
- **name**: A name to give created ops. Defaults to "matrix\_diag\_transform".

Returns:

A `Tensor` with same shape and `dtype` as `matrix`.

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