

## tf.contrib.bayesflow.csiszar\_divergence.symmetrized\_csiszar\_function

```
symmetrized_csiszar_function(
    logu,
    csiszar_function,
    name=None
)
```

Defined in [tensorflow/contrib/bayesflow/python/ops/csiszar\\_divergence\\_impl.py](#).

Symmetrizes a Csiszar-function in log-space.

A Csiszar-function is a member of,

$$F = \{ f: \mathbb{R}_+ \rightarrow \mathbb{R} : f \text{ convex} \}.$$

The symmetrized Csiszar-function is defined as:

$$f_g(u) = 0.5 g(u) + 0.5 u g(1/u)$$

where  $g$  is some other Csiszar-function.

We say the function is "symmetrized" because:

$$D_{\{f_g\}}[p, q] = D_{\{f_g\}}[q, p]$$

for all  $p \ll q$  (i.e.,  $\text{support}(p) \subseteq \text{support}(q)$ ).

There exists alternatives for symmetrizing a Csiszar-function. For example,

$$f_g(u) = \max(f(u), f^*(u)),$$

where  $f^*$  is the dual Csiszar-function, also implies a symmetric f-Divergence.

Example:

When either of the following functions are symmetrized, we obtain the Jensen-Shannon Csiszar-function, i.e.,

$$\begin{aligned} g(u) &= -\log(u) - (1+u) \log((1+u)/2) + u - 1 \\ h(u) &= \log(4) + 2u \log(u/(1+u)) \end{aligned}$$

implies,

$$\begin{aligned} f_g(u) &= f_h(u) = u \log(u) - (1+u) \log((1+u)/2) \\ &= \text{jensen\_shannon}(\log(u)). \end{aligned}$$



**Warning:** this function makes non-log-space calculations and may therefore be numerically unstable for  $|\log u| \gg 0$ .

Args:

- `logu`: `float`-like `Tensor` representing `log(u)` from above.

- `csiszar_function`: Python **callable** representing a Csiszar-function over log-domain.
- `name`: Python **str** name prefixed to Ops created by this function.

## Returns:

- `symmetrized_g_of_u`: **float**-like **Tensor** of the result of applying the symmetrization of `g` evaluated at `u = exp(logu)`.

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