

fn get_rounding_distance

Michael Shoemate

This proof resides in “**contrib**” because it has not completed the vetting process.

Proves soundness of the implementation of `get_rounding_distance` in `mod.rs` at commit `f5bb719` (outdated¹).

1 Hoare Triple

Precondition

Compiler-Verified

- Generic `T` implements trait `Float`
- Type `i32` implements the trait `ExactIntCast<T.Bits>`, where `T.Bits` is the type of the native bit representation of `T`.

User-Verified

None

Pseudocode

```
1 def get_min_k() -> i32:  
2     return -i32.exact_int_cast(T.EXPONENT_BIAS) - i32.exact_int_cast(T.MANTISSA_BITS) + 1
```

Postcondition

Theorem 1.1.

Theorem 1.2. For every setting of the input parameters (`T`) to `get_min_k` such that the given preconditions hold, `get_min_k` raises an exception (at compile time or run time) or returns a valid transformation. A valid transformation has the following properties:

1. (Appropriate output domain). For every element x in `input_domain`, `function(x)` is in `output_domain` or raises a data-independent runtime exception.
2. (Stability guarantee). For every pair of elements x, x' in `input_domain` and for every pair (d_in, d_out) , where `d_in` has the associated type for `input_metric` and `d_out` has the associated type for `output_metric`, if x, x' are `d_in`-close under `input_metric`, `stability_map(d_in)` does not raise an exception, and `stability_map(d_in) ≤ d_out`, then `function(x), function(x')` are `d_out`-close under `output_metric`.

Proof.

□

¹See new changes with `git diff f5bb719..fa860379 rust/src/measurements/noise/nature/float/utilities/mod.rs`