fn then_index_or_default

Michael Shoemate

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

Proves soundness of the implementation of `then_index_or_default` in `mod.rs` at commit f5bb719 (outdated[1]).

This postprocessor indexes into a vector or returns the default value of the type if the index does not exist.

1 Hoare Triple

Precondition

Compiler-Verified

- Generic `T` implements trait `Default`

User-Verified

None

Pseudocode

```
def then_index_or_default(
    index: usize,
) -> Function[Vec[T], T]:
    return Function.new(lambda x: x[index] if index < len(x) else T.default())
```

Postcondition

Theorem 1.1. For every setting of the input parameters (`index, T`) to `then_index_or_default` such that the given preconditions hold, `then_index_or_default` raises an exception (at compile time or run time) or returns a valid postprocessor. A valid postprocessor has the following property:

1. (Data-independent errors). For every pair of elements x, x' in `input_domain`, `function`(x), `function`(x') either neither or both raise an error. If both raise an error, then they both raise the same error.

Proof. The function is infallible, so the function satisfies the data-independent errors property. Therefore the postcondition is satisfied. □

[1] See new changes with `git diff f5bb719..7b13452 rust/src/transformations/scalar_to_vector/mod.rs`