

Adding Support for Other ψ -Functions

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September 14, 2022

1 Introduction

The `robustsurvey` package implements the Huber and Tukey (biweight) ψ -functions. The functions are implemented in the C language, see `src/psifunctions.c`. For the Huber ψ -function, the *standard* function and an asymmetric ψ -function are implemented. The functions are referenced by an integer value (in the C and R source code):

- `psi = 0`: Huber;
- `psi = 1`: asymmetric Huber;
- `psi = 2`: Tukey biweight.

For each type of ψ -function, the following three functions (in the C language) must be defined:

- `psi-function`, $\psi(x)$, the actual ψ -function;
- `weight-function`, $w(x)$, associated with the ψ -function;
- `psi-prime-function`, the first derivative of the ψ -function, $\psi'(x)$.

The ψ -, w -, and ψ' -functions have the same signature, which is shown here for a dummy function `foo()`.

```
double foo(double x, const double k)
{
    # the code goes here
}
```

Argument `x` is the function argument and argument `k` is the robustness tuning constant.

Remark. In this note, we consider only adding support for ψ -functions whose signature comply with the above dummy function. If you want to add functions that do not comply, you have to modify the existing code.

The method dispatch takes place in the functions (see `src/psifunctions.c`):

- `get_wgt_function()`
- `get_psi_function()`
- `get_psi_prime_function()`

and is implemented with function pointers.