Lucas County Housing Example

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This vignette illustrates the package interface on a small sample of the Lucas County housing data. The full empirical analysis requires external data and a separate preprocessing workflow; the current standalone replication script uses only this package sample.

```
library("sssvcqr")

data("lucas_housing_sample")
housing <- lucas_housing_sample

y <- housing$log_price
Z <- model.matrix(~ log_TLA + log_lotsize + sale_year, data = housing)
X <- as.matrix(housing[, c("age_scaled", "age2_scaled")])
u <- as.matrix(housing[, c("longitude", "latitude")])
u <- scale(u)

fit <- ss_svcqr(
  y = y,
  Z = Z,
  X = X,
  u = u,
  tau = 0.5,
  lambda1 = 3,
  lambda2 = 1,
  k_nn = 8,
  control = list(max_iter = 40, warn_nonconvergence = FALSE)
)

summary(fit)

#> Sparse-smooth SVC quantile regression summary
#>   n = 150  q = 4  p = 2  tau = 0.5
#>   lambda1 = 3  lambda2 = 1
#>   iterations = 40  converged = FALSE
#>
#> alpha:
#> [1] -68.79832464   0.92483684   0.11286524   0.03635387
#> beta_G:
#> [1]  0.2284677 -1.2097471
#> delta L2 norms:
#> [1] 0.5144923 0.0000000
```

The coefficient surface returned by `predict(type = "coefficients")` gives the local total effect for each candidate spatially varying covariate.

```r
local_coef <- predict(fit, type = "coefficients")
head(local_coef)

#>           [,1]      [,2]
#> [1,] 0.2226801 -1.209747
#> [2,] 0.2686417 -1.209747
#> [3,] 0.2742627 -1.209747
#> [4,] 0.1921139 -1.209747
#> [5,] 0.2277732 -1.209747
#> [6,] 0.2786426 -1.209747

colMeans(local_coef)

#> [1]  0.2260296 -1.2097471
```