

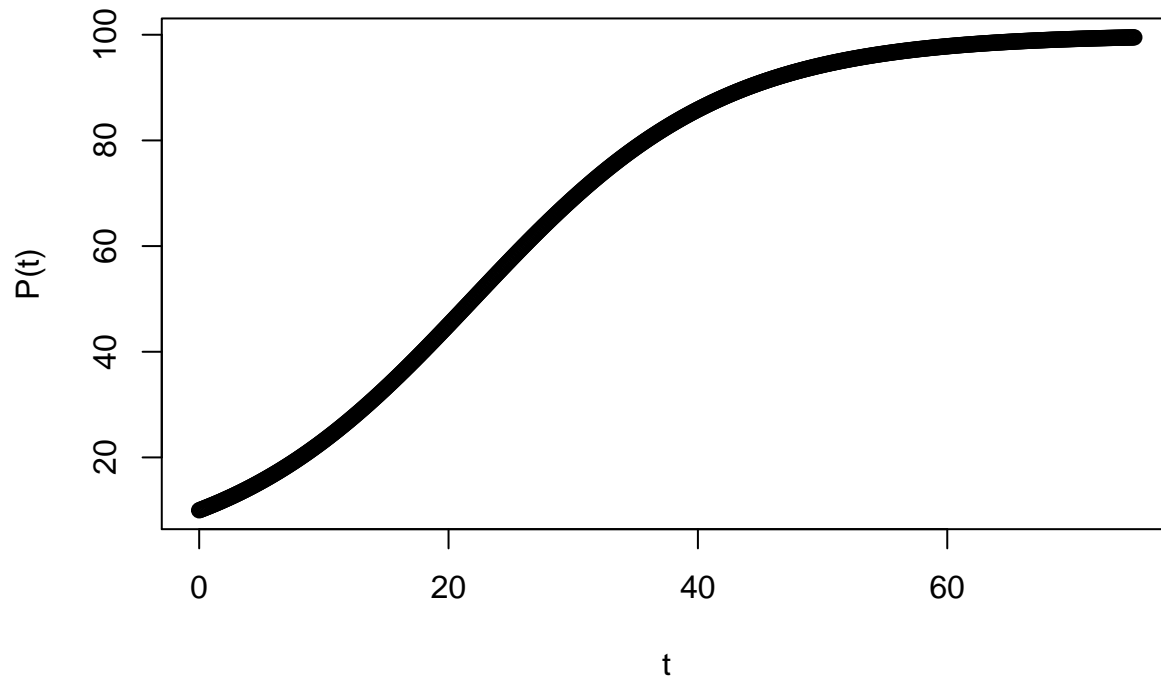
# Smoothing Tests

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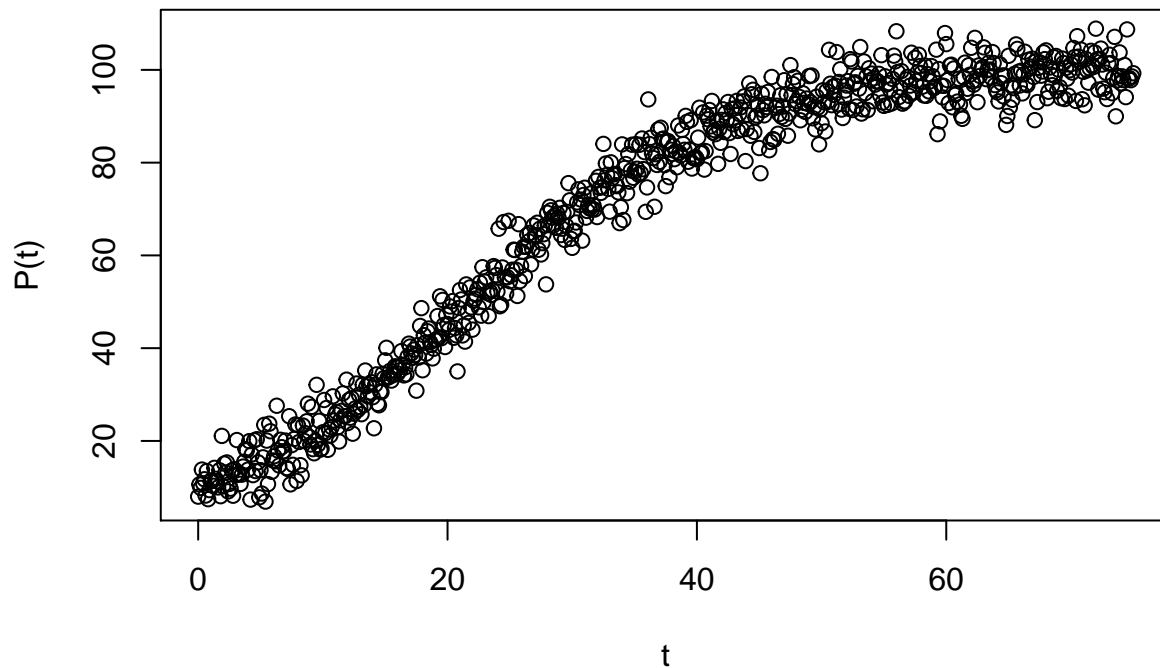
*2019-11-24*

## Testing two-dimensional smoothing.

```
test_2d_nn <- generate_analytic_logistic_data(10, 100, 0.1, 75, 0.1, TRUE)
```



```
test_2d_wn <- generate_noisy_analytic_logistic_data(10, 100, 0.1, 75, 0.1, 0.04, TRUE)
```



Testing the smoothing model.

```
prep_2d_nn <- prep_data(test_2d_nn)
prep_2d_wn <- prep_data(test_2d_wn)
```

```
# Low smoothing works the same with no noise.
cat("Regular; no noise.\n")
```

```
## Regular; no noise.
```

```
plain_2d_nn <- model_logistic_data(prepare_2d_nn)
```

```
## The estimated growth rate is: 0.09999013
## The estimated carrying capacity is: 99.63327
cat("Smoothing = 0.001; no noise\n")
```

```
## Smoothing = 0.001; no noise
```

```
ridge_2d_nn <- model_logistic_data_smoothing(prepare_2d_nn, 0.001)
```

```
## The estimated growth rate is: 0.09994828
## The estimated carrying capacity is: 99.87962
```

```
# Testing the regular model with noise.
cat("Regular; 4% noise.\n")
```

```
## Regular; 4% noise.
```

```
plain_2d_wn <- model_logistic_data(prepare_2d_wn)
```

```
## The estimated growth rate is: 9.567297
## The estimated carrying capacity is: 14.34748
```

Test a range of smoothing values.

```
smoothing_vals <- c(0.001, 0.01, 0.1, 1, 2, 5, 10, 100)
i <- 1
```

```

for (lambda in smoothing_vals) {
  msg <- paste0("Smoothing = ", lambda, "\n")
  cat(msg)
  name <- paste0("smoothing_2d_", i)
  i <- i + 1
  model <- model_logistic_data_smoothing(prepare_2d_wn, lambda)
  assign(x = name, value = model)
}

```

```

## Smoothing = 0.001
## The estimated growth rate is: 9.565916
## The estimated carrying capacity is: 14.34729
## Smoothing = 0.01
## The estimated growth rate is: 9.553503
## The estimated carrying capacity is: 14.34561
## Smoothing = 0.1
## The estimated growth rate is: 9.431129
## The estimated carrying capacity is: 14.32887
## Smoothing = 1
## The estimated growth rate is: 8.360178
## The estimated carrying capacity is: 14.1636
## Smoothing = 2
## The estimated growth rate is: 7.423445
## The estimated carrying capacity is: 13.98439
## Smoothing = 5
## The estimated growth rate is: 5.555565
## The estimated carrying capacity is: 13.47295
## Smoothing = 10
## The estimated growth rate is: 3.913592
## The estimated carrying capacity is: 12.69894
## Smoothing = 100
## The estimated growth rate is: 0.6164286
## The estimated carrying capacity is: 6.243815

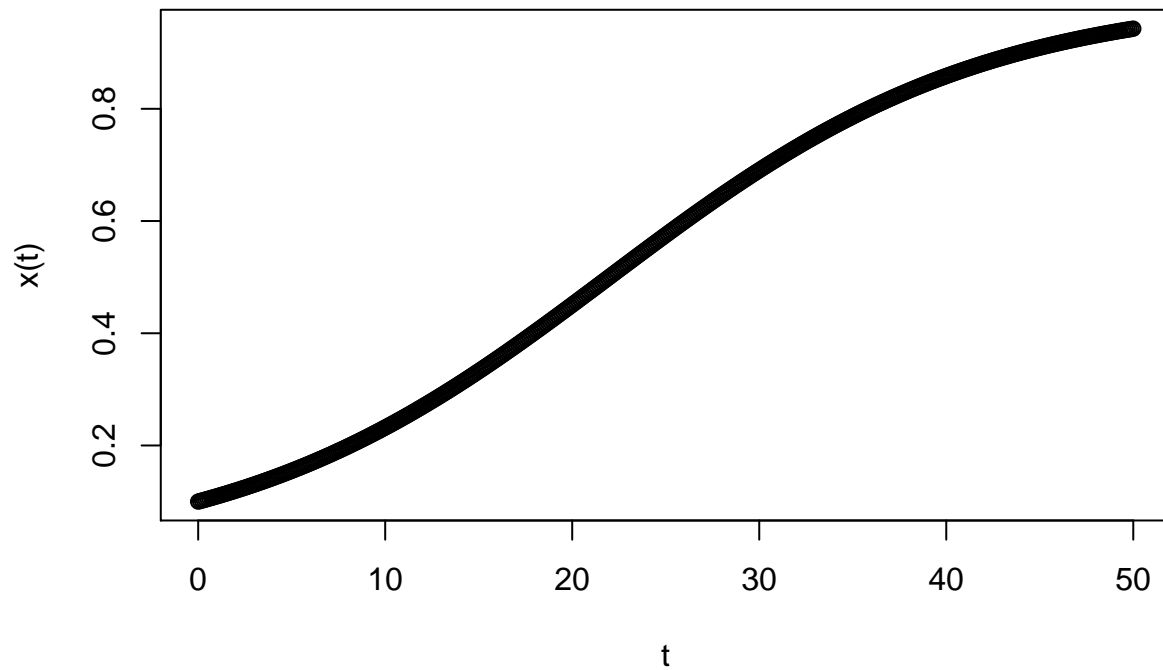
```

Now, generate two one-dimensional test-cases.

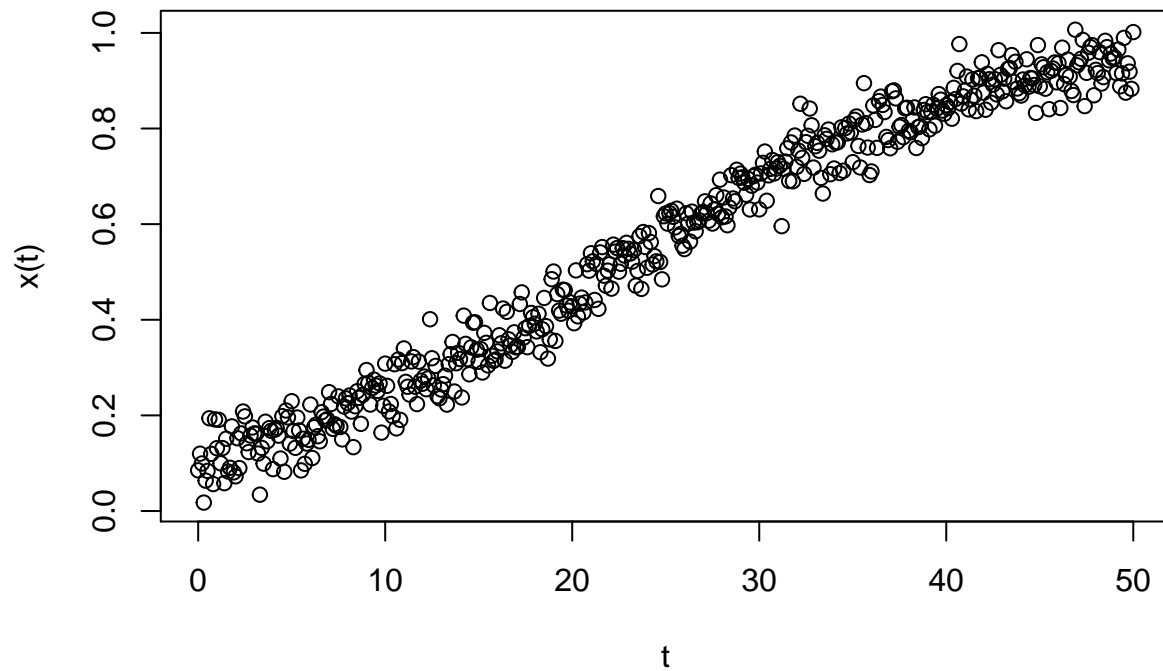
```

test_1d_nn <- generate_dimensionless_logistic_data(.1, 0.1, 50, 0.1, TRUE)

```



```
test_1d_wn <- generate_noisy_dimensionless_logistic_data(0.1, 0.1, 0.04, 50, 0.1, TRUE)
```



Doing the fits.

```
prep_1d_nn <- prep_data(test_1d_nn)
prep_1d_wn <- prep_data(test_1d_wn)

# Low smoothing works the same with no noise.
cat("Regular; no noise.\n")
```

```
## Regular; no noise.
```

```

plain_1d_nn <- model_logistic_data_1D(prepare_1d_nn)

## The estimated growth rate is: 0.09993782
cat("Smoothing = 0.001; no noise\n")

## Smoothing = 0.001; no noise
ridge_1d_nn <- model_logistic_data_1D_smoothing(prepare_1d_nn, 0.001)

## The estimated growth rate is: 0.09993516
# Testing the regular model with noise.
cat("Regular; 4% noise.\n")

## Regular; 4% noise.
plain_1d_wn <- model_logistic_data_1D(prepare_1d_wn)

## The estimated growth rate is: 0.3780789
Testing a bunch of smoothing values in the 1D case.
smoothing_vals <- c(0.001, 0.01, 0.1, 1, 2, 5, 10, 100)
i <- 1
for (lambda in smoothing_vals) {
  msg <- paste0("Smoothing = ", lambda, "\n")
  cat(msg)
  name <- paste0("smoothing_1d_", i)
  i <- i + 1
  model <- model_logistic_data_1D_smoothing(prepare_1d_wn, lambda)
  assign(x = name, value = model)
}

## Smoothing = 0.001
## The estimated growth rate is: 0.3780687
## Smoothing = 0.01
## The estimated growth rate is: 0.3779768
## Smoothing = 0.1
## The estimated growth rate is: 0.3770606
## Smoothing = 1
## The estimated growth rate is: 0.3681363
## Smoothing = 2
## The estimated growth rate is: 0.3587033
## Smoothing = 5
## The estimated growth rate is: 0.3330976
## Smoothing = 10
## The estimated growth rate is: 0.2976815
## Smoothing = 100
## The estimated growth rate is: 0.1021617

```