

Lecture 10 Demo

Completed Demo, compiled by Ethan

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0.1 Demo Description

In this demo, we simulate taking a sample of 500 cats from a population with some proportion of FIV-positive cats, recording the observed proportion of FIV-positive cats in the sample, and storing this number. We then repeat this 10,000 times, and plot the resulting distribution to obtain an approximate sampling distribution of \widehat{P} .

```
[1]: import random as rnd
import numpy as np
import scipy.stats as sps
```

```
[2]: %matplotlib inline
import matplotlib
import matplotlib.pyplot as plt
plt.style.use('seaborn-v0_8-whitegrid')
```

```
[3]: samp_size = 500
```

```
[4]: props = []
B = 10000

for b in np.arange(0, B):
    x = rnd.choices(['Positive', 'Negative'],
                    weights = [0.035, 1 - 0.035], k = samp_size)

    count = 0
    for k in np.arange(0, samp_size):
        if x[k] == "Positive":
            count += 1

    props.append(count / samp_size)
```

```
[5]: x = np.linspace(0, 0.07, 150);

plt.hist(props,
         edgecolor = 'white',
         density = True);

plt.plot(x,
```

```
sps.norm.pdf(x, 0.035, np.sqrt( 0.035 * (1 - 0.035) / samp_size))
);
plt.xlabel("x");
plt.ylabel("y");
plt.title("Sampling Distribution of  $\widehat{P}$ ");
```

