



ICE M1012: Stochastic Theory of Communication Lab

Assignment

Submitted to

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Pdf of Binomial Distribution

Code :

```
n_trials = 1000;
n_flips = 21;

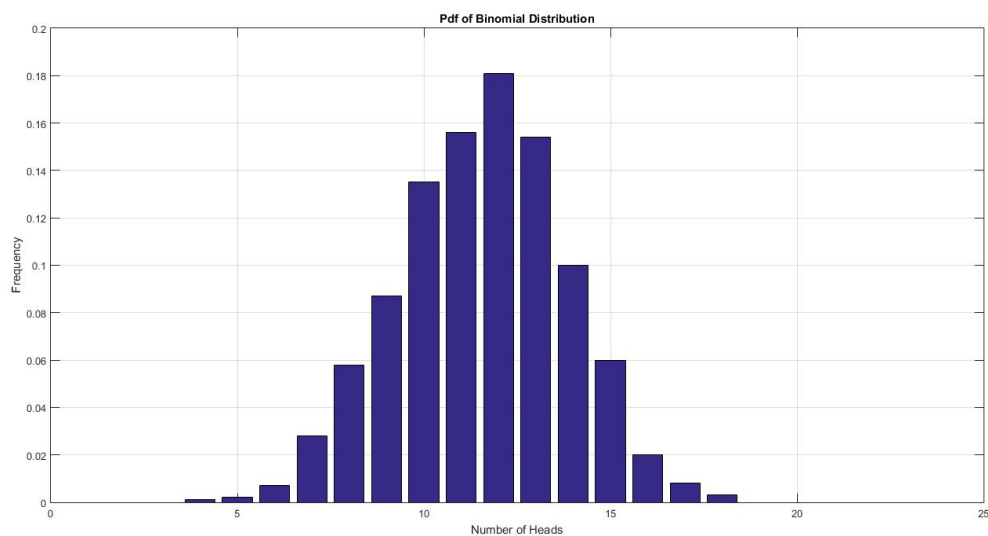
values = zeros(1, n_flips);

% Simulating coin flips
for i = 1:n_trials
    numberOfHeads = sum(randi([0,1], 1, n_flips)); %
Vectorized operation
    values(numberOfHeads + 1) = values(numberOfHeads
+ 1) + 1; % Adjusting index since MATLAB arrays are
1-indexed
end

valuesFloat = values / n_trials; % Vectorized
operation

% Plotting
figure;
bar(valuesFloat);
xlabel('Number of Heads');
ylabel('Frequency');
title('Pdf of Binomial Distribution');
grid on;
```

Result:



Pdf of Geometric Distribution

Code :

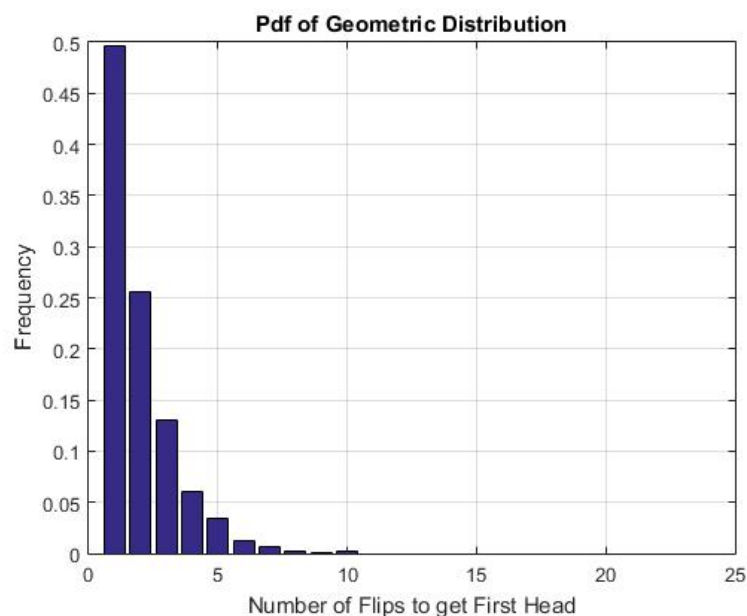
```
totalExperiment = 1000;
numberOfFlipsUntilFirstHead = zeros(1, 20);

for i = 1:totalExperiment
    numberOfTrial = 0;
    while randi([0,1]) == 0
        numberOfTrial = numberOfTrial + 1;
    end
    numberOfFlipsUntilFirstHead(numberOfTrial + 1) =
numberOfFlipsUntilFirstHead(numberOfTrial + 1) + 1;
end

numberOfFlipsUntilFirstHead =
numberOfFlipsUntilFirstHead / totalExperiment;

bar(numberOfFlipsUntilFirstHead);
xlabel('Number of Flips to get First Head');
ylabel('Frequency');
title('Pdf of Geometric Distribution');
grid on;
```

Result:



Steady State Matrix Generation

Code :

```
% Example matrix
matrix = [1, 0, 0;
          0.002, 0.998, 0;
          0, 0.002, 0.998];

% Parameters
threshold = 1e-5;
maxIterations = 5000;

result = matrix;

for i = 1:maxIterations
    previousResult = result;
    result = result * matrix;
    if norm(result - previousResult, 1) < threshold
        disp(i);
        break;
    end
end

roundedMatrix = round(result, 2);

disp('Steady State Matrix:');
disp(result);
disp('Rounded Steady State Matrix:');
disp(roundedMatrix);
```

Result:

```
3712

Steady State Matrix:
    1.0000         0         0
    0.9994    0.0006         0
    0.9950    0.0044    0.0006

Rounded Steady State Matrix:
     1     0     0
     1     0     0
     1     0     0
```