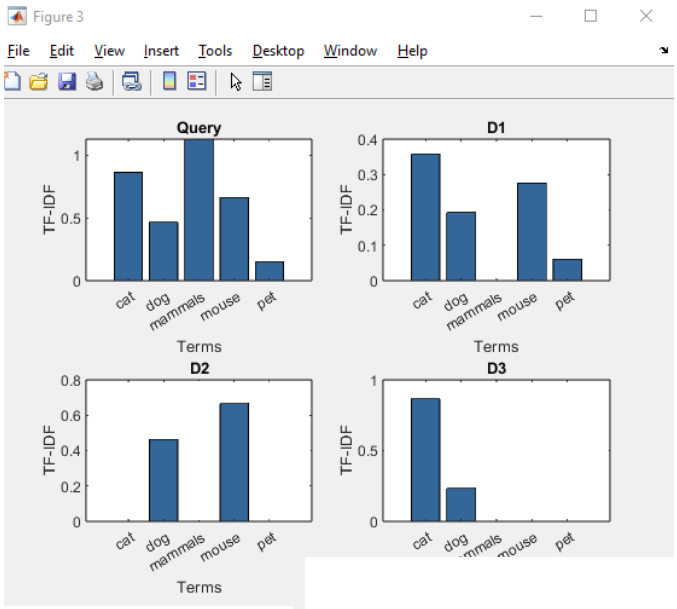
Computer Vision Exercise 7

1.
```
IDF of cat: 4.3219
IDF of dog: 2.3219
IDF of mammals: 5.6439
IDF of mouse: 3.3219
IDF of pet: 0.7370
```




```
Term freq for Query:
cat: 0.20
dog: 0.20
mammals: 0.20
mouse: 0.20
pet: 0.20
Term freq for Document 1:
a: 0.25
and: 0.08
be: 0.08
cat: 0.08
dog: 0.08
is: 0.17
may: 0.08
mouse: 0.08
pet: 0.08
Term freq for Document 2:
all: 0.20
and: 0.20
are: 0.20
dog: 0.20
mouse: 0.20
Term freq for Document 3:
a: 0.10
along: 0.10
and: 0.10
but: 0.10
cat: 0.20
dog: 0.10
eat: 0.10
get: 0.10
may: 0.10
```

```
Cosine sim in Document 1: 0.7267
Cosine sim in Document 2: 0.4933
Cosine sim in Document 3: 0.5813
```

2. Precision = TP / (TP + FP) = 300 / 350 = 0.8572 -> 85.72%
   Recall = TP / (TP + FN) = 300 / 500 = 0.60 -> 60%
3.
   a. Part1:
      I. A reason for the change is the contrast change of the images' content, which is controlled by the peakThreshold variable. The density of SIFT features could highly be affected by this. Therefore, adjusting this variable, or adding contrast is also a solution. Alternatively, having an adaptive thresholding based on local contrast could help.
      In low contrast images, the edges and features of the image can get indistinguishable, especially when the image includes complex patterns as SIFT's gradient calculations orientations can get confused. Ambiguity can appear when the texture the algorithm encounters is uniform, which can lead to multiple orientations being assigned to the same feature.
      II. The descriptors of SIFT are constructed using histograms of gradient orientations in relatively larger areas, which is why it is able to handle tranformations better.
      Changes in viewpoint can cause disruptions, or extreme rotations/scaling.