
Subject: Re: Fuzzy classification

Posted by [Vincenzo Positano](#) on Tue, 18 May 2004 12:08:03 GMT

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"Joao F." <joao.antunes@agr.unicamp.br> ha scritto nel messaggio
news:7568d93c.0405140734.5b3e4df4@posting.google.com...

> Hello,

>

> I am looking for an IDL implementation of the fuzzy c-means (FCM)
> clustering algorithm and fuzzy maximum likelihood algorithm (FML) to
> classication of satellite images. The resulted cluster centers
> obtained by the FCM algorithm from the first step are input into the
> FML algorithm.

>

This is an implementation of FCM for image segmentation.
mu initialization should be adapted to your problem.
The function seems to work on medical images with 3-4
classes.

Vincenzo Positano

```
;image segmentation based on fuzzy clustering
```

```
;
```

```
; image          input image
```

```
; num_class      number of classes
```

```
; m             fuzzy factor
```

```
; eps           threshold
```

```
; n_max         max iteration number
```

```
; a            cluster centers
```

```
function fuzzy_clustering,image,num_class,m,eps,n_max,CENTER=a
```

```
sz=SIZE(image,/DIMENSIONS)
```

```
x = REFORM(image,sz[0]*sz[1])
```

```
n=LONG(N_ELEMENTS(x))
```

```
c=num_class
```

```
a=DBLARR(c)
```

```
mu=DBLARR(c,n)
```

```
kk=0
```

```
;mu initialization
```

```
idx=WHERE(image le 20)
```

```
mu[0,idx]=1.0
```

```
idx=WHERE((image ge 20) and (image lt 200))
```

```

mu[1,idx]=1.0
idx=WHERE(image ge 200)
mu[2,idx]=1.0

mu_old=DBLARR(c,n)

me=(2/(m-1.0))

while (kk le n_max) do begin
  for i=0L,c-1 do begin
    tmp=REFORM(mu[i,*],n)
    num = tmp^m*x
    den = tmp^m
    a[i]=TOTAL(num)/TOTAL(den)
  endfor

  for i=0L,c-1 do begin
    num = DBLARR(c,n)
    den = DBLARR(c,n)
    num[0,*]=(ABS(x-a[i]))^me
    for k=0L,c-1 do begin
      den[k,*]=(ABS(x-a[k]))^me
      num[k,*]=num[0,*]
    endfor
    pippo=TOTAL(num/den,1)
    mu[i,*]=1.0/pippo
  endfor

  diff = TOTAL(ABS(mu-mu_old))/FLOAT(n)

  if (diff le eps) THEN KK=n_max
  mu_old=mu
  kk=kk+1

endwhile

return,mu

end

```
