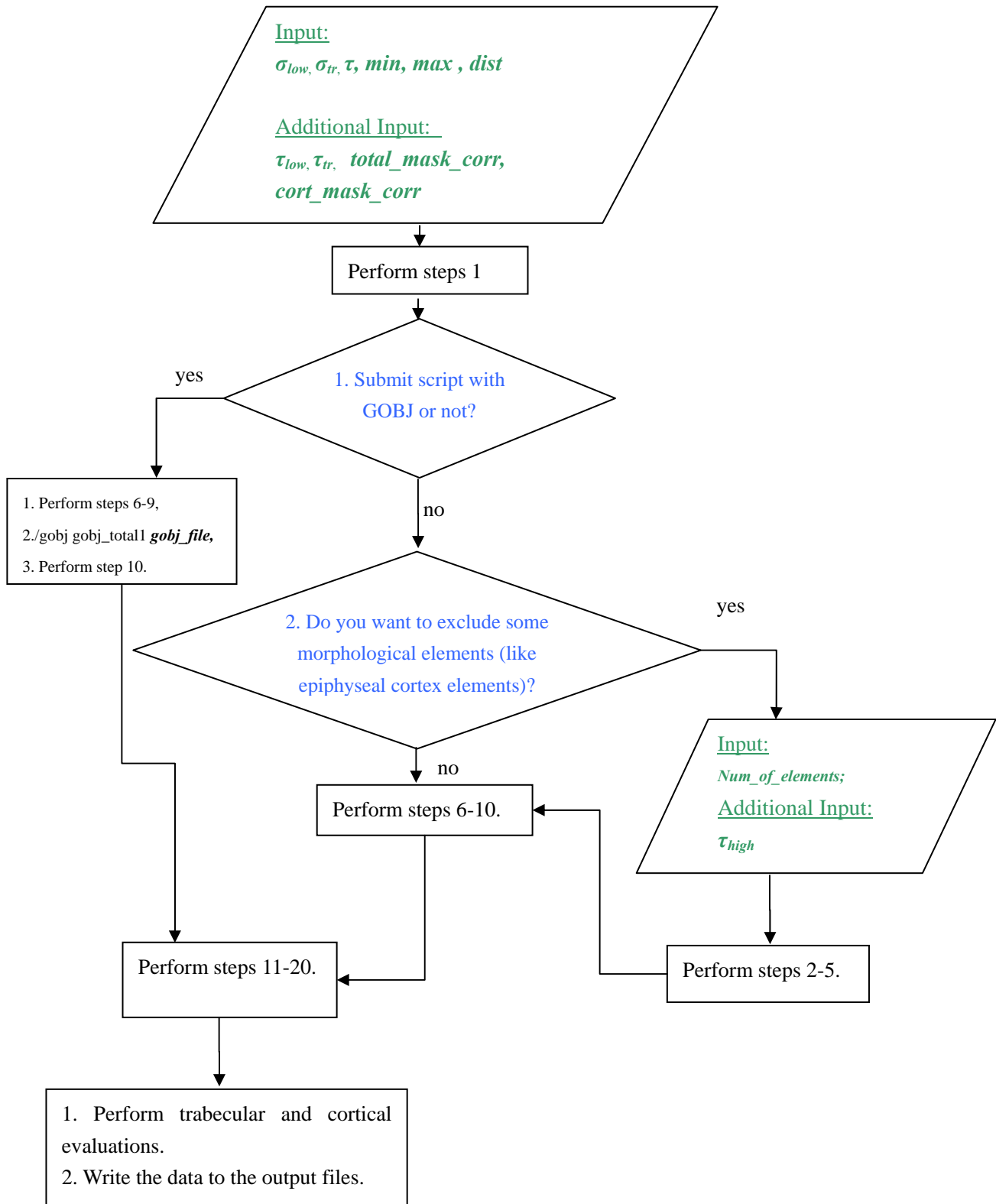


This separation algorithm has been described in:

Lublinsky, S., Ozcivici, E., Judex. S. (2007) An automated algorithm to detect the trabecular-cortical bone interface in microCT images. *Calcified Tissue International*.

Flow Chart for the Separation Procedure



The following variables can be used as default choices:

```
 $\tau_{high} = \tau + 1\%;$   
 $\tau_{low} = \tau - 7.5\%;$   
 $\tau_{tr} = \tau + 6\%;$   
 $total\_mask\_corr = 2;$   
 $cort\_mask\_corr = 2;$ 
```

IPL Routine for Generation of Trabecular and Cortical masks

```
$ define org_file 'p1' (input raw gray scale image)

$ cort_mask = "'p1'"-F$PARSE(P1,,,"VERSION")-".AIM"+"cort_mask.aim"
$ trab_mask = "'p1'"-F$PARSE(P1,,,"VERSION")-".AIM"+"trab_mask.aim"
$ peel_mask = "'p1'"-F$PARSE(P1,,,"VERSION")-".AIM"+"peel_mask.aim"
$ max_mask = "'p1'"-F$PARSE(P1,,,"VERSION")-".AIM"+"max_mask.aim"
$ smooth = "'p1'"-F$PARSE(P1,,,"VERSION")-".AIM"+"smooth.aim"
$ correction = "'p1'"-F$PARSE(P1,,,"VERSION")-".AIM"+"correction.aim"

$ ipl_scanco_prog := $um:ipl_scanco_m.exe
$ ON ERROR THEN EXIT
$ ipl_scanco_prog

/db_scanco_activate true
/read org1 org_file

1!**Expanding the borders of the VOI (STEP 2)**
/border_change org1 org 20 20 0
/copy org fan

2!**Application of narrow box-shaped Gaussian kernel (STEP 2)**
/gauss_lp org gauss 9 1
/threshold gauss seg  $\tau_{high}$ 

3!**Excluding growth plate elements from the total mask (STEP 2)**
/cl_rank_extract seg seg1 2 num_of_elements
/inv seg1
/copy seg1 segp1

4!**Epiphyseal elements' size compensation (STEP 2)**
/peel3d segp1 segp 3
/bound segp cl
/write cl "correction"

5!**Creating gray scale image without epiphyseal elements (STEP 2)**
/gobj_mask org "correction"
/invert_ow cl
```

```
/write cl "correction  
/gobj_mask fan "correction  
/fill_min_max_ow fan 0 30  
/add fan org new  
/bound new new1  
/write new1 "new_gray"
```

6!Creation of the solid cortical shell (STEP 2)

```
/seg_gauss new1 gobj_mask  $\sigma_{low}$   $1.5\sigma_{low}$   $\tau_{low}$   
/cl gobj_mask 1 1  
/copy gobj_mask gobj  
/invert_ow gobj
```

7!Bone marrow selection (STEP 2)

```
/cl gobj 2 6
```

8!Combining bone marrow and cortical shell into the total mask (STEP 2)

```
/add gobj gobj_mask gobj_total
```

9!Smoothing of the periosteal edge of the total mask (STEP 2)

```
/write gobj_total "smooth  
/gobj gobj_total "smooth total_mask_corr  
/cl gobj_total 1 1  
/growback gobj_total "smooth gobj_total1 total_mask_corr
```

10!Writing the total mask into the output(STEP 2)

```
/write gobj_total1 gobj_file
```

11!Cortical pre-mask creation (STEP 3)

```
/read org org_file  
  
/seg_gauss org pre_mask  $\sigma_{tr}$   $1.5\sigma_{tr}$   $\tau_{tr}$   
  
/cl pre_mask 1 1  
/read total_mask gobj_file
```

12!Minimal thickness (STEP 4)

```
/gobj_mask total_mask gobj_file min  
/write total_mask "peel_mask  
/subtract_aims gobj_file total_mask peel_min
```

13!Maximal thickness (STEP 4)

```
/gobj_mask total_mask "peel_mask max-min  
/subtract_aims gobj_file total_mask peel_max  
/write peel_max "max_mask
```

14!Minimal thickness + pre-cortical mask (STEP 4)

```
/add peel_min pre_mask mask
```

15!Maximal mask subtraction (STEP 4)****

```
/gobj_mask mask "max_mask 0
```

```
/cl mask 1 1
```

16!Filling potential voids in the cortical mask (STEP 4)****

```
/copy mask mask_inv
```

```
/inv mask_inv gobj_file
```

```
/cl mask_inv 2 6
```

```
/add mask mask_inv mask_cort
```

17!Smoothing of the inner edge of the cortical mask (STEP 5)****

```
/inv mask_cort gobj_file
```

```
/write mask_cort "smooth
```

```
/gobj_mask mask_cort "smooth cort_mask_corr
```

```
/cl mask_cort 1 1
```

```
/growback mask_cort "smooth trab_mask cort_mask_corr
```

18!Creating the trabecular and cortical masks (STEP 6)****

```
/write trab_mask "smooth
```

```
/copy trab_mask cort_mask
```

```
/gobj_mask trab_mask "smooth dist
```

19/write trab_mask "trab_mask_file

```
/inv cort_mask none
```

20/write cort_mask "cort_mask_file

```
..
```