

ACTIVE NODE TRANSCODER CONTROL CENTER

Architecture Document

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ARCHITECTURE

“Active Node Control Center” works with 3 control files defined by AVT:

- 1) bypass.par – MV bypass ON/OFF.
- 2) rate.par -- file with target bit-rate value.
- 3) adjustq -- file with “quality windows” definitions.

IMPLEMENTATION AND DESIGN

“Active Node Control Center” is implemented under jdk 1.2.1

“Active Node Control Center” consists of two parts:

1. Node Control
2. Application Control

Node Control consists of:

- a) Network Bandwidth slider.
 - 1) It has a scale of numbers, which represent bit-rates in Kb/s. These numbers change from 0 to 4000.
 - 2) Whenever the position of slider is changed a new bit-rate value is written to the file “rate.par”.

Info: file “rate.par” is the control file for AVT.

- The value in this file provides target bit-rate (in bits per second) for video stream converted by transcoder.
- Value “0” (the slider is at “0” position) in this file means that the incoming video will be re-encoded with the same bit-rate as it came.
- File “rate.par” is read by transcoder before each process of frame re-encoding. I.e. the changes in file “rate.par” take effect from the next encoded frame.

- b) CPU load slider.

- 1) It has a scale of numbers, which represent virtual CPU load in percentage of the total CPU power. These numbers change from 0% to 100%.

- 2) The critical point on this scale is 50%. If slider goes to the right of this value (becomes more than 50%), then “1 1” couple of integer flags would be written to the “bypass.par” file. If slider goes to the left of this value (becomes less than 50%), then “1 0” couple of integers would be written to the “bypass.par” file.

Info: file “bypass.par” is the control file for AVT.

- “1 1” – such record in the file “bypass.par” would mean, that transcoder will use MV bypass option while re-encoding video sequence. With this option MV information from incoming video stream will be re-used in the process of encoding output video stream, what provides savings in computational time.
- “1 0” – such record in the file “bypass.par” would mean, that transcoder will run in the full re-encoding mode – all information about video sequence will be recalculated during encoding.
- File “bypass.par” is read by transcoder before each process of frame re-encoding. I.e. the changes in file “bypass.par” take effect from the next encoded frame.

Application Control consist of three buttons:

a) “Manual tracking” button:

- 1) “Manual tracking” button pops up a new window, which provides control over “quality windows”.
- 2) This new windows gives a “virtual area” to draw “quality windows” for encoding video.

Info:

- “Quality window” – is the displaying part of the video frame, which might have different visible quality than the rest of the video frame. The reason is in the amount of bits used to encode this part of the video frame.
- “Quality window” has following parameters “Xt Yt Xb Yb K”
 - Xt is right top X-coordinate of the “quality window”.
 - Yt is right top Y-coordinate of the “quality window”.
 - Xb is left bottom X-coordinate of the “quality window”.
 - Yb is left bottom Y-coordinate of the “quality window”.K is the “quality window” parameter – it’s the integer value. In the case it’s positive, the area inside “quality window” will be higher quality than by default encoding, the bigger K the more bits will be allocated for that area – the higher picture quality will be received. In the case it’s negative, the area inside “quality window” will be lower quality than by default encoding, the smaller K the less bits will be allocated for that area – the lower picture quality will be received. In the case it’s zero, the area inside “quality window” will be the same quality as by default encoding.

Note: Xt, Yt, Xb, Yb are the percentage values, which represent virtual frame of the size 100% \times 100%. That means these parameters can vary only from 0 to 100

- 4) Actual visible size of the “virtual area” is 740 by 480 pixels (made to represent the common size of a video frame). It has a grid net with values 0 to 100 on X-axis and values 0 to 100 on Y-axis.
- 5) It’s possible to draw three “quality windows” on the “virtual area”.
For each “quality window” there is the button with window sequence number.
After the button for particular window was pressed, “quality window” could be “drown” on the grid are by pressing mouse and dragging it, until the “quality window” with desired size is received. Top left and bottom corners of the “quality window” have their coordinates displayed (coordinates for virtual scale).
After “quality window” is drown, coordinates Xt, Yt, Xb, Yb with some other parameters (read explanation bellow in the text) are written to the “adjustq” file.
- 6) For each of three “quality window” there’s a slider with integer values from –10 to 10.

Slider provides control over K value for the particular “quality window”.

Info: file “adjustq” is the control file for AVT. It contains string with following structure --
N Xt Yt Xb Yb K, where N is the sequence number of a quality window (in the case of
this interface N=3), and other parameters are described above.

Example of “adjustq” file:

```
1 50 50 70 70 3  
2 0 10 30 40 -5  
3 30 20 90 80 10
```

- Whenever some events happen – whether the “quality window” is drawn or K value is changed – new Xt Yt Xb Yb K values would be written to Nth string in the the “adjustq” file. N would be the number of the “quality window” for these events took place.
- File “adjustq” is read by transcoder before each process of frame re-encoding. I.e. the changes in file “bypass.par” take effect from the next encoded frame.

b) “Machine tracking” button:

It is a dummy button.

c) “Content tracking” button:

It is a dummy button.