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(54) **METHOD OF INCREASING CODING EFFICIENCY AND REDUCING POWER CONSUMPTION BY ON-LINE SCENE CHANGE DETECTION WHILE ENCODING INTER-FRAME**

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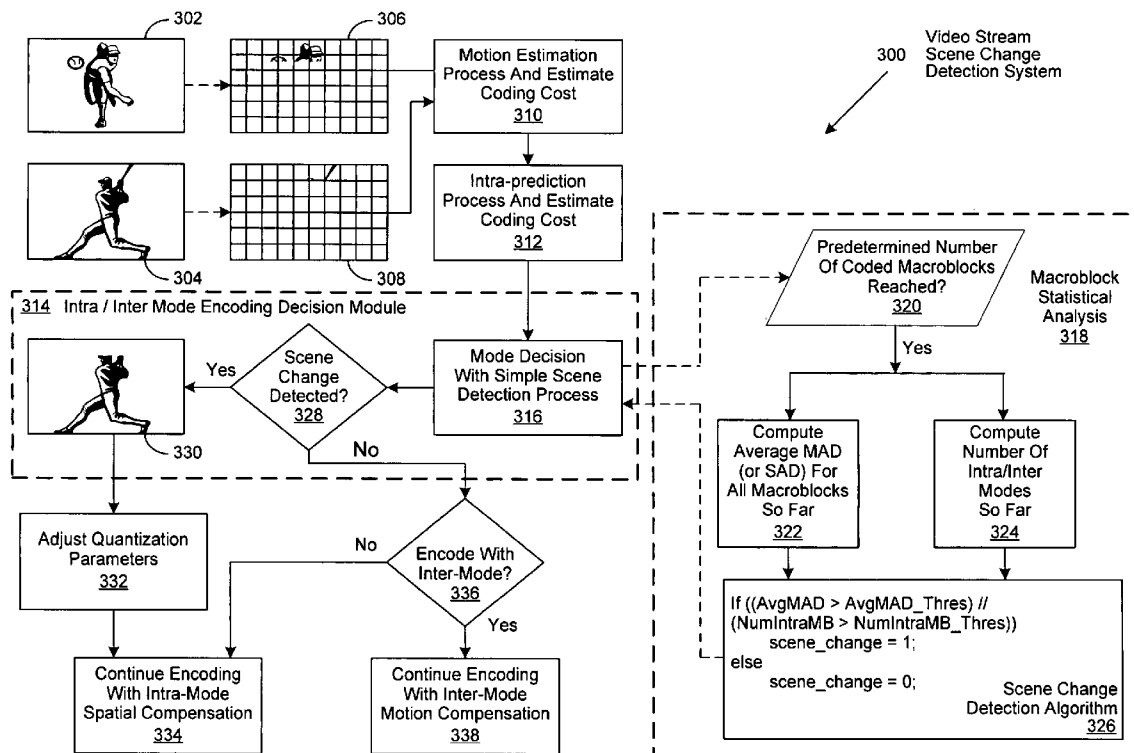**AUSTIN, TX 78720**

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(57) **ABSTRACT**

A system and method for on-the-fly detection of scene changes within a video stream through statistical analysis of a portion of the macroblocks comprising each video frame as they are processed using inter-frame coding. If the statistical analysis of the selected macroblocks of the current frame differs from the previous frame by exceeding predetermined thresholds, the current video frame is assumed to be a scene change. Once a scene change is detected, the remainder of the video frame is encoded as an intra-frame, intra-macroblocks, or intra slices, through implementation of one or more predetermined or adaptively adjusted quantization parameters to reduce computational complexity, decrease power consumption, and increase the resulting video image quality. As decoding is the inverse of encoding, these improvements are similarly recognized by a decoder as it decodes a resulting encoded video stream.

Prior Art
100   Video Compression
System

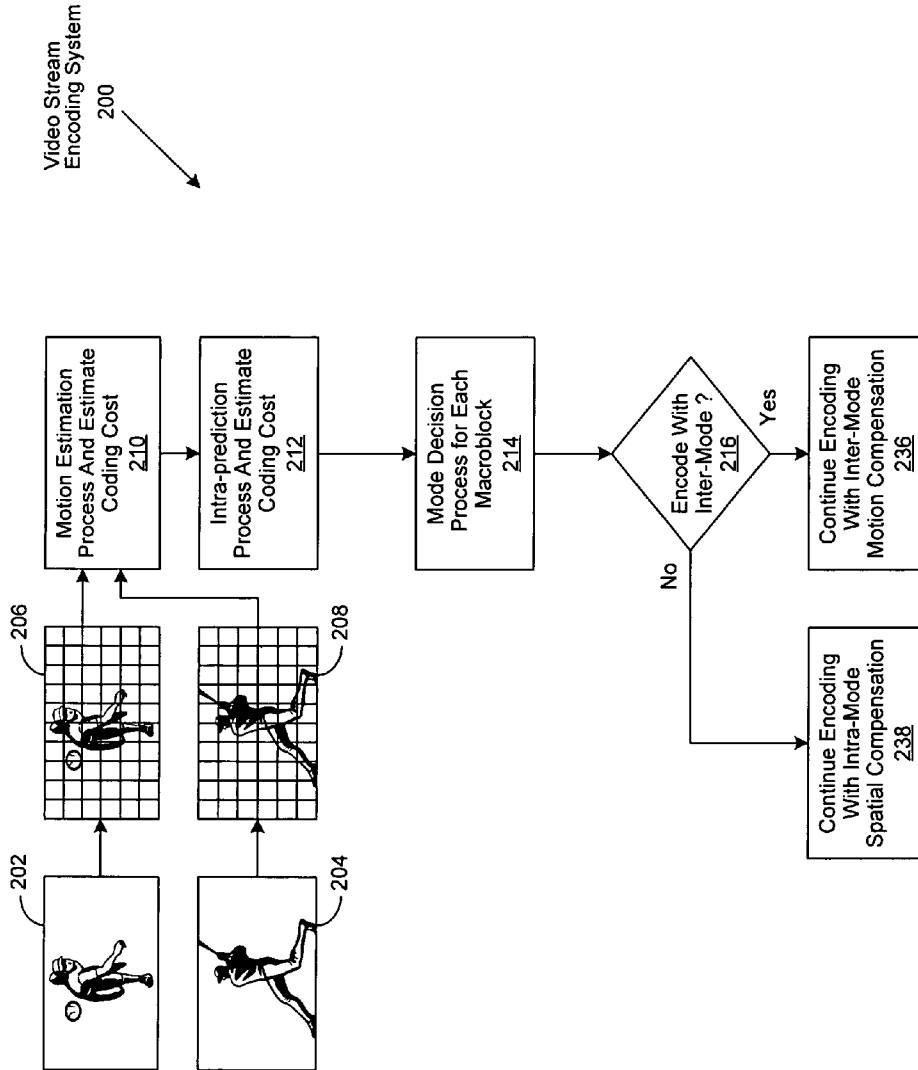Previous Frame
102

Current Frame
106

Frame Segmentation
108

Macroblocks
104

Macroblocks
110

Macroblocks
110

Motion Estimation
112

Matching
Macroblocks
114

Motion
Vectors
116

Prediction Error Coding
118

Transmission

FIGURE 1
(Prior Art)

Video Stream
Encoding System
200

206

202

208

204

Motion Estimation
Process And Estimate
Coding Cost
210

Intra-prediction
Process And Estimate
Coding Cost
212

Mode Decision
Process for Each
Macroblock
214

Encode With
Inter-Mode ?
216

No

Yes

Continue Encoding
With Inter-Mode
Motion Compensation
236

Continue Encoding
With Intra-Mode
Spatial Compensation
238

FIGURE 2
(Prior Art)

FIGURE 3

Video Stream Scene Change Detection System 300

Macroblock Statistical Analysis 318

Predetermined Number Of Coded Macroblocks Reached? 320

Yes

Compute Average MAD (or SAD) For All Macroblocks So Far 322

Compute Number Of Intra/Inter Modes So Far 324

Scene Change Detection Algorithm 326

If ((AvgMAD > AvgMAD_Thres) // (NumIntraMB > NumIntraMB_Thres))
    scene_change = 1;
else
    scene_change = 0;

Motion Estimation Process And Estimate Coding Cost 310

Intra-prediction Process And Estimate Coding Cost 312

306

308

302

304

314 Intra / Inter Mode Encoding Decision Module

Mode Decision With Simple Scene Detection Process 316

Scene Change Detected? 328

Yes

No

330

Adjust Quantization Parameters 332

Continue Encoding With Intra-Mode Spatial Compensation 334

Encode With Inter-Mode? 336

Yes

No

Continue Encoding With Inter-Mode Motion Compensation 338

FIGURE 4

DOCKET ALARM
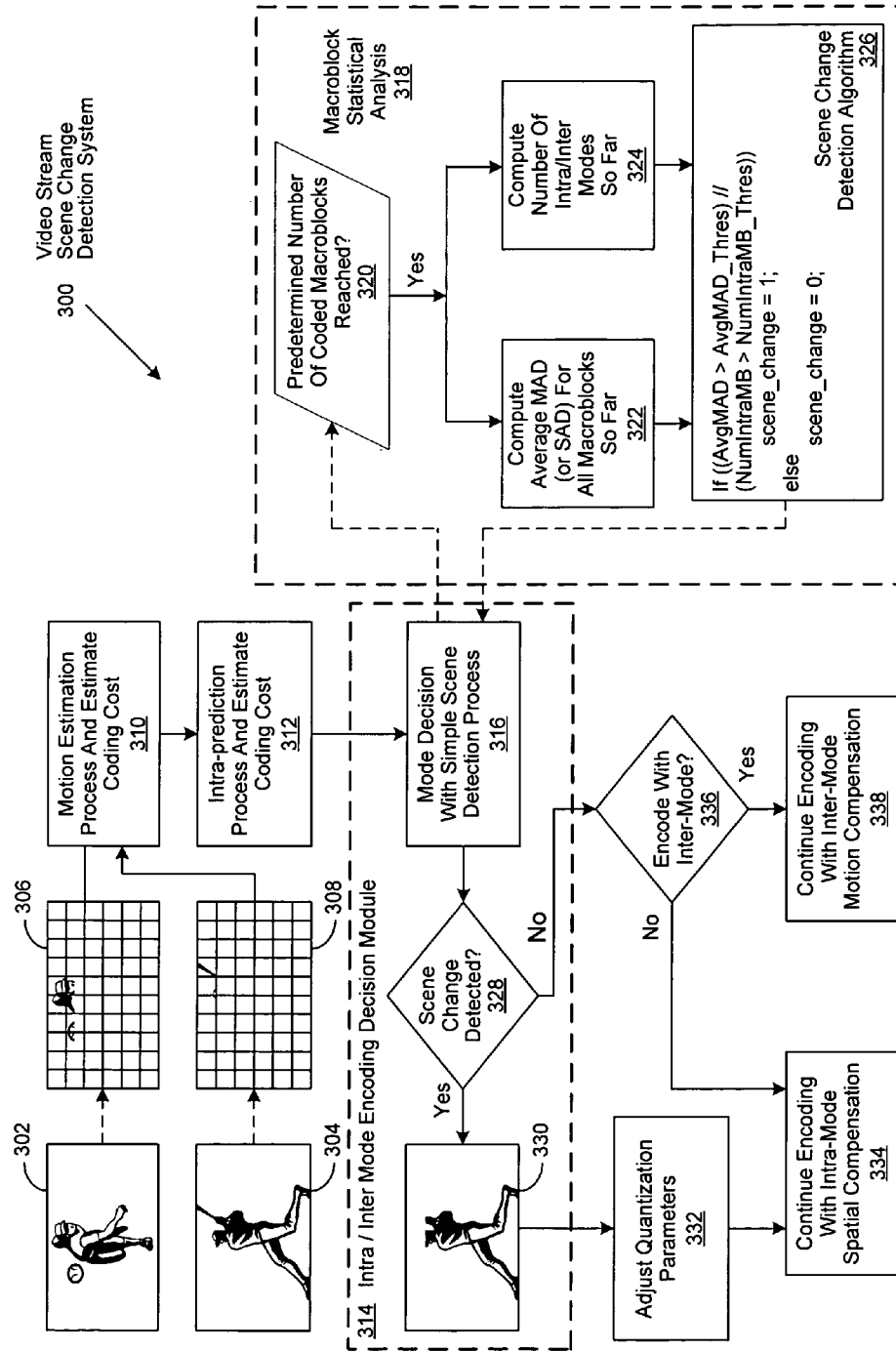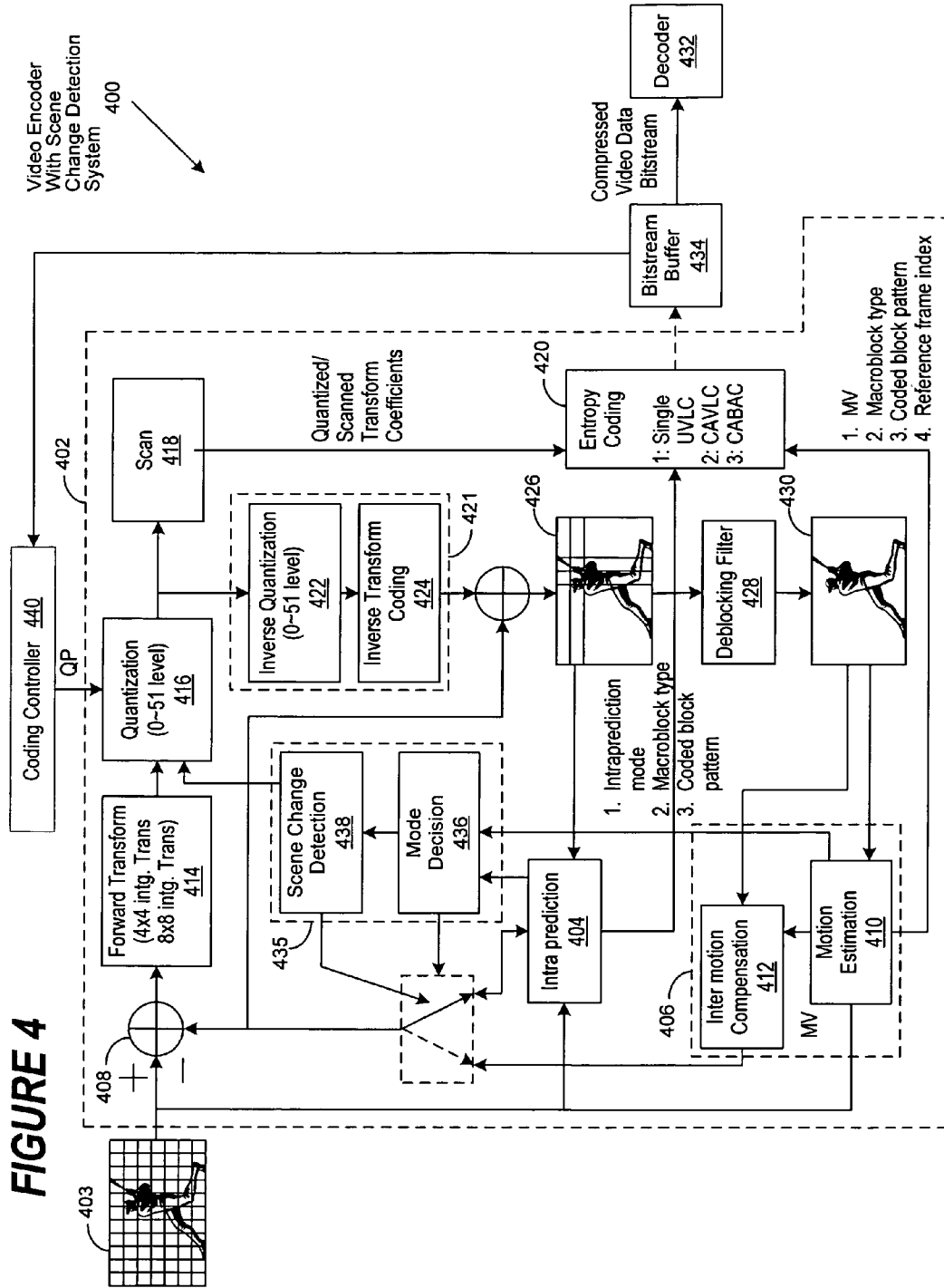
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