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(54) Title: METHODS AND DEVICES FOR PERFORMING SAMPLE ADAPTIVE OFFSET (SAO) FILTERING

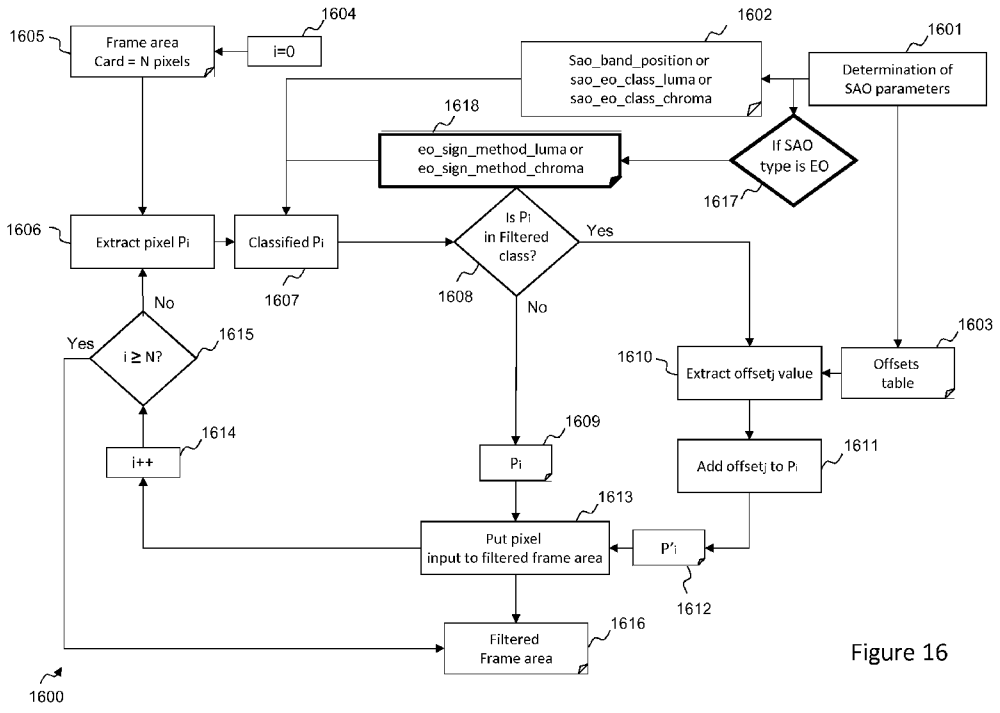

Figure 16

(57) Abstract: The present invention relates to methods for improving the coding efficiency of images subjected to the SAO filtering. According to a first aspect of the invention, there is provided a method of performing sample adaptive offset (SAO) filtering on an image comprising a plurality of image parts, the method comprising: obtaining an edge offset to perform a SAO filtering; applying an edge offset classification to at least one pixel of the image using a predetermined sign method for determining an index of the edge offset; wherein the predetermined sign method is signalled in the bitstream. Correspondingly, there is provided a method of providing an edge offset to perfom a sample adaptive offset (SAO) filtering on an image, the method comprising: computing an edge offset to perform the SAO filtering; selecting a sign method among a plurality of possible sign methods for determining an index of the edge offset; and signalling the selected sign method in the bitstream thereby allowing the edge offset classification to be performed according

[Continued on next page]

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Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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06 February 2020 (06.02.2020)

to the selected sign method.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/066320

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N19/80 H04N19/86
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/070147 A1 (ERICSSON TELEFON AB L M [SE]) 16 May 2013 (2013-05-16) the whole document -----	1-10,46, 48,49, 51,52
A	CHIH-MING FU ET AL: "Sample Adaptive Offset in the HEVC Standard", IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, US, vol. 22, no. 12, 1 December 2012 (2012-12-01), pages 1755-1764, XP011487153, ISSN: 1051-8215, DOI: 10.1109/TCSVT.2012.2221529 the whole document -----	1-10,46, 48,49, 51,52

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 October 2019	08/01/2020

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Kulak, Eray

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2019/066320

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 11-45, 47, 50
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-10, 46, 48, 49, 51, 52

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10, 46, 48, 49, 51, 52

   signalling a sign method
   ---

2. claims: 11-15, 45, 47, 50

   selecting a sign method among plurality of alternatives
   ---

3. claims: 16-42

   signalling sign of edge offsets
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4. claims: 43, 44

   computing edge offsets and setting the minimum value of edge offsets
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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 11-45, 47, 50

The subject matter of claims 11-45,47,50 is independent than the first subject matter 1-10,46,48,49,51,52.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2019/066320

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013070147 A1	16-05-2013	EP 2777265 A1	17-09-2014
		US 2014294068 A1	02-10-2014
		WO 2013070147 A1	16-05-2013
		WO 2013070148 A1	16-05-2013