



(11) **EP 3 467 713 A8**

(12) **CORRECTED EUROPEAN PATENT APPLICATION**

(15) Correction information:
Corrected version no 1 (W1 A1)
Corrections, see
Bibliography INID code(s) 72

(51) Int Cl.:
G06K 9/62 ^(2006.01) **G06K 9/46** ^(2006.01)

(48) Corrigendum issued on:
05.06.2019 Bulletin 2019/23

(43) Date of publication:
10.04.2019 Bulletin 2019/15

(21) Application number: **18192803.7**

(22) Date of filing: **05.09.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **03.10.2017 US 201715723597**

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(54) **LEARNING METHOD AND LEARNING DEVICE FOR IMPROVING IMAGE SEGMENTATION AND TESTING METHOD AND TESTING DEVICE USING THE SAME**

(57) A method for improving image segmentation by using a learning device is disclosed. The method includes steps of: (a) if a training image is obtained, acquiring $(2-K)_{th}$ to $(2-1)_{th}$ feature maps through an encoding layer and a decoding layer, and acquiring 1_{st} to H_{th} losses from the 1_{st} to the H_{th} loss layers respectively corresponding to H feature maps, obtained from the H filters, among the $(2-K)_{th}$ to the $(2-1)_{th}$ feature maps; and (b) upon performing a backpropagation process, performing processes of

allowing the $(2-M)_{th}$ filter to apply a convolution operation to $(M-1)_{2-th}$ adjusted feature map relayed from the $(2-(M-1))_{th}$ filter to obtain M_1 -th temporary feature map; relaying, to the $(2-(M+1))_{th}$ filter, M_2 -th adjusted feature map obtained by computing the M_{th} loss with the M_1 -th temporary feature map; and adjusting at least part of parameters of the $(1-1)_{th}$ to the $(1-K)_{th}$ filters and the $(2-K)_{th}$ to the $(2-1)_{th}$ filters.

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