

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
18 January 2024 (18.01.2024)



(10) International Publication Number
WO 2024/015019 A1

(51) International Patent Classification:
G06V 20/58 (2022.01) G06V 10/82 (2022.01)
G06V 10/80 (2022.01)

(21) International Application Number:
PCT/SG2023/050491

(22) International Filing Date:
12 July 2023 (12.07.2023)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10202250434A 12 July 2022 (12.07.2022) SG

(71) Applicant: **NANYANG TECHNOLOGICAL UNIVERSITY** [SG/SG]; 50 Nanyang Avenue, Singapore 639798 (SG).

(72) Inventors: **LYU, Chen**; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG).
HU, Zhongxu; c/o Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 (SG).

(74) Agent: **DAVIES COLLISON CAVE ASIA PTE. LTD.**;
10 Collyer Quay #07-01, Ocean Financial Centre, Singapore 049315 (SG).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT,

(54) Title: DRIVER ATTENTION MODELLING SYSTEM

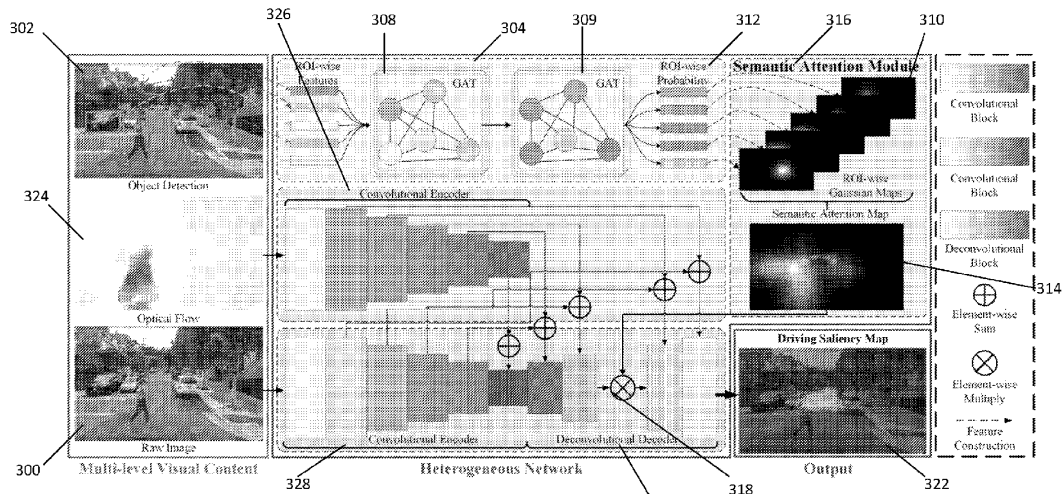


Figure 3

(57) Abstract: A system for estimating a driver attention map is disclosed. The processors receive a stream of images captured from a camera directed towards a field of view of a driver of a vehicle. An image is processed using a first neural network to determine an image feature map, and using an object detection model to detect objects in the at least one image. A graph representation of the detected objects is the defined — the graph comprises nodes (detected objects) and connections (relationships between detected objects). The image feature map and graph representation are integrated to obtain a driver attention map corresponding forthe image. An optical flow map can also be included forthe integration. The driver attention map estimates regions of attention of a driver's visual perception.

[Continued on next page]

LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE,
SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *of inventorship (Rule 4.17(iv))*

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))*