

Claims

1. A computer implemented method for determining graphical user interface, GUI, interaction information for an end user device, the method comprising:
 - 5 analysing device state information using one or more GUI spying modes to obtain, for each of the one or more GUI spying modes, a respective estimate of GUI interaction information for the device state information;
classifying, for each of the one or more GUI spying modes, the respective estimate of GUI interaction information based on a reference model; and
 - 10 outputting GUI interaction information based on results of the classifying, wherein the GUI interaction information output based on the results of the classifying is for use in process automation.
2. The method of claim 1, wherein the one or more GUI spying modes comprise
15 one or more modes for communicating with Application Programming Interfaces, APIs, native to the end user device, wherein the APIs are capable of directly accessing GUI-element attributes through programmatic interfaces stored on the end user device, and wherein a respective estimate of GUI interaction information is estimated by accessing GUI interaction information from the APIs.
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3. The method of any preceding claim, wherein the one or more GUI spying modes comprise post-processing methods.
4. The method of claim 3, wherein the post-processing methods comprise
25 computer vision tools.
5. The method of any preceding claim, wherein the reference model comprises a heuristic model based on predetermined rules.
- 30 6. The method of any one of claims 1 to 4, wherein the reference model comprises a multi-modal deep learning model trained on historic data.

7. The method of any preceding claim, wherein analysing the device state information and classifying the corresponding respective estimate of GUI interaction information is performed for a plurality of GUI spying modes in series.
- 5 8. The method of any one of claims 1 to 6, wherein analysing the device state information and classifying the corresponding estimate of GUI interaction information is performed for a plurality of GUI spying modes in parallel.
9. The method of any preceding claim, wherein classifying, for each of the one
10 or more GUI spying modes, the respective estimate of GUI interaction information based on a reference model comprises classifying the respective estimate of GUI interaction information as either true or false.
10. The method of claim 9, when dependent on claim 7, wherein a final GUI
15 spying mode of the plurality of GUI spying modes is a computer vision tool and wherein the corresponding respective estimate of GUI interaction information is classified as true.
11. The method of claim 9, wherein classifying, for each of the one or more GUI
20 spying modes, the respective estimate of GUI interaction information is terminated when a true classification is determined, and wherein outputting GUI interaction information based on results of the classifying comprises outputting the respective estimate of GUI interaction information that is classified as true.
- 25 12. The method of any one of claims 1 to 8, wherein classifying, for each of the one or more GUI spying modes, the respective estimate of GUI interaction information based on a reference model comprises assigning scores to subsets of the respective estimate of GUI interaction information based on the reference model.
- 30 13. The method of claim 12, wherein outputting GUI interaction information based on results of the classifying comprises outputting a classified respective estimate of GUI information with a highest total score.

14. The method of claim 12, wherein outputting GUI interaction information based on results of the classifying comprises filtering and aggregating classified respective estimates of GUI interaction information based on the scores.
- 5 15. The method of claim 14, wherein filtering comprises disregarding subsets of the classified respective estimates of GUI interaction information with scores below a predetermined threshold.
- 10 16. The method of claim 12, wherein outputting GUI interaction information based on results of the classifying comprises aggregating classified respective estimates of GUI interaction information with scores above a predetermined threshold.
- 15 17. The method of any preceding claim, wherein outputting GUI interaction information based on results of the classifying comprises outputting subsets of classified respective estimates of GUI interaction information estimated using one or more of a plurality of GUI spying modes.
- 20 18. The method of any preceding claim, wherein analysing device state information using one or more GUI spying modes to obtain, for each of the one or more GUI spying modes, a respective estimate of GUI interaction information occurs at every instance of user interaction.
- 25 19. A non-transitory computer readable medium comprising instructions for causing a computer to execute instructions according to the method of any one of claims 1 to 18.
20. A system comprising:
a display for displaying a GUI of an end user device; and
at least one processor coupled to the display, the at least one
30 processor configured to execute instructions according to the method of any one of claims 1 to 18.