Indoor positioning and tracking techniques using consumer mobile devices

Researchers at the University of Oxford have developed visual odometry algorithms based on machine learning approaches.

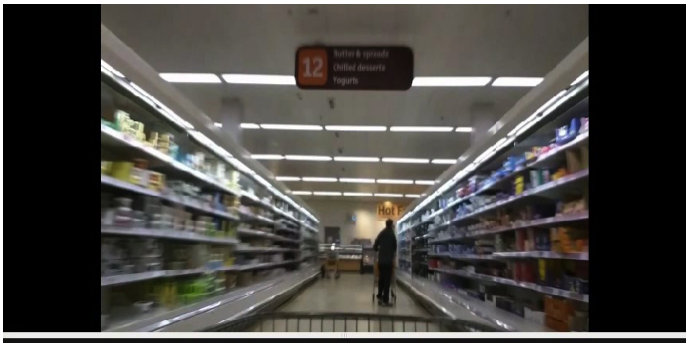
Visual odometry – localising mobile devices

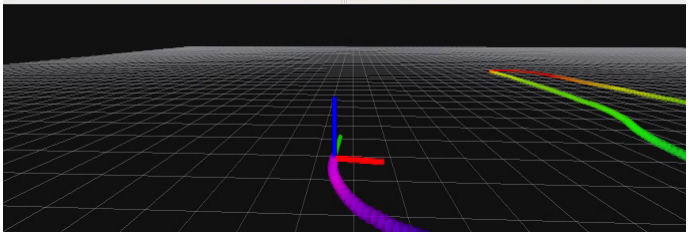
Odometry is the use of data collected during motion to calculate the relative location of a device in space. Visual odometry relies on images captured by on-board cameras to determine position and orientation. Visual odometry algorithms have been applied in a range of situations, from the MER (Mars Exploration Rover) missions to autonomous passenger vehicles.

Building on the visual approach, by combining image data with inertial data (IMU in visual-inertial odometry) a more accurate estimation of position and orientation can be generated, however such algorithms are not as widely applied at present.

Less calibration, better localisation

Current visual odometry approaches require large datasets and time-consuming calibration before they can function at an optimal level. This becomes an issue in visual-inertial odometry, where the two sensors must be calibrated independently and together.





From the Mars Rover to a mobile roamer

Researchers at the University of Oxford have developed new visual and visual-intertial odometry algorithms that utilise a machine learning approach. These robust algorithms can operate effectively without calibration and in low-light environments. Automotive and pedestrian data sets have been used in validation and they have been tested in real-time.

We believe that the Oxford algorithms offer the following advantages over existing solutions:

- No calibration required
- Function with and without IMU data
- Can be trained using any image set
- Tolerates unknown and previously unseen environments
- Increase in performance over time
- Applications in VR, mobile phones and low-light environments

Patent protection

Oxford University Innovation have filed patents covering both the visual and visual-inertial odometry approaches and are seeking partners to aid in the commercialisation of this technology.

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Technology Transfer from the University of Oxford