JUST WALK OUT TECHNOLOGY

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Abstract: *In today's world, technology plays a vital role, without technology it is hard to imagine our day to day life. Everyday an innovation is taking place in some part of the world. 'Just walk out technology' is such an example of innovation and sheer brilliance that will take the world by storm. Currently this technology is been used by self-driving cars and major online shopping giant 'Amazon'. Amazon have launched it as 'Amazon go'. But this technology has vast applications in various fields and will play lives changing role in near future.*

Keywords: Sensor fusion, deep learning, RFID tag computer vision

1. Introduction

When you submit your paper print it in two-column format, Just Walk Out Technology automatically detects when products are taken from or stored back to the shelves and keeps track of them in a virtual cart. While you're carried out buying, you could just go away from the shop. Rapidly after, Amazon will deduct money from customers Amazon account and send customer a receipt.
This technology is being presently enforced by Amazon as Amazon Go, that offers checkout-free shopping expertise and it's created potential by an equivalent kinds of technologies as utilized in self-driving cars, face recognition system etc. that are computer vision, sensing element fusion, RFID tag and deep learning. Amazon hasn't yet revealed how these technologies work in co-ordination with each other but we have tried to explain the functioning of Just Walk out Technology according to the working of Computer vision, Sensor fusion and deep learning,RFID tag. Computer vision, Sensor fusion, RFID tag and deep learning is explained below.

2. Technology Used

Sensor fusion:
What is sensor fusion?
Well toanswerthat question let ustake a look at example;Imagineyou're using navigation onyour smartphone and you enter a tunnelwhere you suddenly lose theGPS signalhave you ever wondered how yoursmartphone is able to continue to locateyour position through the tunnelIt usesa technique called deadreckoning.
Dead reckoning calculates the real time tracking when youloose theGPS signal to calculate theposition changes, your smartphone hasbuilt-in sensorsspecificallyaccelerometers and gyroscopes and usingthe sensors and some heftydata frommath is able to calculate your positionwith surprising accuracy.

The concept ofcombining data from the Accelerometer andthe gyroscope is known as sensor fusionother applications which use sensorfusion are:
- Robotics
- Industrial controlssuch asplatform stabilization and human

Body position monitoring which is widelyused in gaming, military movement scienceand medical applications such as knee braces.
To understand more clearly about sensor fusion just look at the table below showing the strength and the weakness of accelerometer and gyroscope.
At low frequency accelerometer gives optimum result whereas at high frequency gyroscope provides optimum value. Hence these two sensors accelerometer and gyroscope which are fused together in order to get optimum result at low or high frequency.

Deep Learning:
Deep learning is the creation of machines which uses techniques inspired by the human brain's ability to learn. Until recently we simply didn't have enough data and processing power to train a machine to learn deep learning. Neural networks learn many levels of abstractions they range from simple contacts to complex ones, this is what puts deep in deep learning. Each layer groups some type of data rarefy it and processes it along to the next. Deep learning lets the machine to use this method to create a ranked illustration thus initial layer as an example with a automatic face recognition system would possibly lookfor simple edges the next might look for different shapes and so on. After all these processes the machine computes all the results together to recognize certain objects. GPU's compute data at a very rapid rate and is considered as a backbone of deep learning. Deep learning is having countless applications ranging for medical diagnosis, robotics, self-driving cars and many more. Just walk out

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technology is one such major upcoming example of deep learning.
Other Practical examples consist of:
1. Just walk out technology.
2. Automobile, pedestrian and landmark identification for driver assistance.
3. Photograph recognition.
4. Human speech recognition and translation.
5. Natural language processing.
6. Life sciences.

RFID tag:

The most straight forward way for Amazon to achieve this concept is to use RFID technology.
Amazon's RFID system would work very equally as an anti-theft RFID tag in which when an item ofstolen clothing is passed through the RFID sensors near the exit of a store an alarm goes off.
In Amazon's case there is no alarm, this event instead triggers the Amazon Go app to add items
to the customer's cart. RFID is abbreviation of Radio Frequency Identification.
Functioning Principle of RFID Device:
RFID (radio frequency identification) is a technique facilitating identification of any product or itemwithout the requirement of any line of sight amid transponder and reader.
RFID Structure is continuously composed of 2 main hardware components. The transponderwhich is located on the product to be scanned and the reader which can be either just a reader ora read & write device, depending upon the system design, technology employed and therequirement. The RFID reader characteristically comprise of a radio frequency module, acontrolling unit for configurations, a monitor and an antenna ti investigate the RFID tags. Inaddition, a number of RFID readers are in-built with an extra interface allowing them to forwardthe data received to another system (control system or PC).
RFID Tag – The actual data carrying tool of an RFID structure, in general comprise of an antenna
(Coupling element) and an electronic micro-chip.

Computer Vision:
Computer vision is a subject of technology that works on enabling computers to seem, discover and methodology pictures among identical manner thathuman vision does, after which provides suitable output.There is a brand new basic software system referred to as Sentisight that is meant for developerswhowant to use computer vision-based object recognition in their applications. Sentisightis a vision-based object recognition technology that can be used in a wide variety of applications for manufacturing to interactive toys to law enforcement.

For example:- Sentisight can be used in augmented reality applications that recognize logos or packaging of consumer goods. Another example of an augmented reality application would be for real time recognition of a building in the city. Sentisight can also be used for image based search

applications such as internet searches. Other applications for Sentisight object recognition technology include:

1. Search and discovery of image or brand usage
2. Document and stamp recognition
3. Identification of a place from a photograph
4. Augmented and extended reality applications such as smart toys that interact with a child or that recognize special cards or pictograms.

Law enforcement applications such as:
5. Object counting and inspection for manufacturing and logistics
6. Tattoo recognition
7. Robotic navigation and manipulation

How does it work
First, Sentisight learns an object from a set of images containing the object you specify the region of the image which should be learned by masking the image or shape. It is better when specified regions contain only the object itself and not its surroundings otherwise it could result in Misclassification. After an object has learned Sentisight can then the object in a particular frame (such as an image from a still or video camera) and identify the object's location. If there are several instances of a learned object Sentisight can count them.
Once the learned object is recognized then lightweight tracking can be used to follow the object's movements in subsequent frames.

3. Conclusion
This technology is a boon in the modern era as it saves time & human labor. This technology has the potential to change the lifestyle of the masses for forever if implemented properly. Just walk out technology uses Sensor fusion, deep learning and Computer vision which are or can be prominently used in Self -driving cars, Robotics and Artificial Intelligence.

4. Acknowlegement

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