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Accurate Object Location Upgrading in Computer Network Based Virtual Reality Using Clustering Techniques

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ABSTRACT

Most of the functions imbedded on virtual reality systems are highly dependent on positioning algorithm. system need to be designed in such way that accurate positioning can be ensured while object movements. Indoor positioning system is imposing great challenge since it cannot be linked to GPS system. Hence, location optimization and positioning process at indoor systems need to be performed using own (internal) positioning algorithms that depends on local sensors integrated with the mobile object itself. The results shown that total consumption time (which was used as performance metric to judge the used algorithms) is maximum with Spearman method which was equal to 0.0661 seconds whereas it is far less when Correlation method is used (equal to 0.0234 second).

Keywords: Robotics, KNN, correlation, positioning, GPS, time delay

INTRODUCTION

The technology development led to new approaches that facilitates human life such as robots where machines are depended to solve daily problems of human. The revolution of information technology and computer programming is greatly expanded especially when internet and mobile networks evolved.

The number of internet user is largely increased which makes knowledge granting is easier than anytime. Hence, technology of localizing was amongst the concerns of positioning engineering where device need to move as accurate as possible reaching the destination point.

Positioning technology is utilized the machines alike Direct Current (DC) motors in order to perform automatic tasks that difficult to be performed by human. Positioning were used in very accurate industries such as electronics and chip manufacturing as well as in heavy industries alike automobiles. Most of the functions imbedded on positioning systems are highly dependent on positioning algorithm. system need to be designed in such way that accurate positioning can be ensured while object movements.

Geographical location and positioning signaling (GPS) is one of the leading technologies for positioning in the outdoor environments. This system is determining the object location by sending the signal from the GPS handset/sensor to the satellite or even using the mobile/cellular towers in the vicinity. In this chapter, problem statement about indoor positioning system where the challenges facing the indoor positioning system are listed. The objectives and thesis organization are also listed.

Indoor positioning system is imposing great challenge since it cannot be linked to GPS system. Hence, location optimization and positioning process at indoor systems need to be performed using own (internal) positioning algorithms that depends on local sensors integrated with the mobile object itself.

PROBLEM STATEMENT

Positioning system at indoor locality is suspected to the below challenges:

1. sensors calibration problem where the responses for same event can be differs. This is an electronic issue which impact the accuracy of the position that sensors are yielding. Utmost, no sensor can provide the location coordination as such. In more cases,

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infrared sensor is sued which shoot beams on the four directions and decide whither any of the direction is available i.e. (no obstacles are placed). Those sensors are big time consumers which apply extra payload to the positioning system [2].

2. other sensors alike accelerometer and gyroscope are also in use for location detection, such sensors are producing large amount of information, in other word, the accelerometer and gyroscope sensors are generating large amount of geographical coordination which need supper processing power for addressing the burst of information.

3. difficulty in integration of artificial intelligence (AI) i.e. machine learning and deep learning to the machinery systems in real-life especially while using the device arm in surgeries and medical applications. There was a risk factor introduced in the literature where the AI technology cannot be relied at all real-life applications.

4. even-though, AI applications are intervened in location detection (positioning) systems, challenges are arisen since the data sources are limited where the training of AI models can not be complied [4].

5. training of AI model with particular data at known noise level may server the purpose unless more noise impact is applied to the data which increases the shift between the train and test data and hence trigger more errors at the results.

METHODOLOGY

The K-Nearest Neighborhood and distance equation with specified threshold are used to solve the uncertainty problem and to specify the node that is close to device location. a mobile vehicle traverses an unknown environment; while doing so, distance meter and compass measure its own movement, and the laser detects external objects or features in this environment, with which all these sensors build nodes in the map. These nodes are concurrently used to get localized in it. The distance meter and compass are used to calculate the device position in X and Y Cartesian coordinate by increase the meter when the compass mentions to the north or east and decrease the meter when the compass mentions to the south or west.

In this experiment, eight similarity measurement techniques were used for identifying the moving oath of the object namely Jaccard, Euclidean, Cityblock, Chebychev, Cosine, Correlation and Validation. The similarity of path is differing in each mentioned techniques in accordance to the x-axis and y-axis coordination as shown in Table 1 and Table 2.

Table 1: Time consumption by different tools of similarly detection

Similarity measurement	Execution Time (Second)
Jaccard	0.000414
Euclidean	0.000528
Cityblock	0.000573
Chebychev	0.000361
Cosine	0.000405
Spearman	0.000661
Correlation	0.000234
Variation	0.000376

The mentioned approaches are made the similarity measure and hence the time taken by each technique for evaluation of the similarity of paths is illustrated in Table 1. The same can be illustrated in Figure 3.

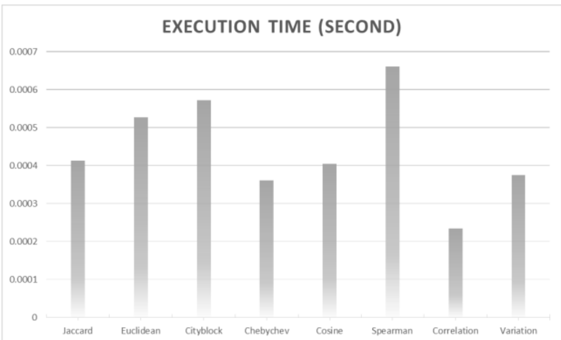

Figure 3: Time consumption by different path similarity detection approaches

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Table 2: Numerical results of the techniques used for location detection of moving object

Y	X	jaccard	euclidean	Cityblock	Chebychev	Cosine	Spearman	Correlation	Variation
583	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
582	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
581	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
580	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
579	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
523	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
522	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
521	94	1	10.488088	18	9	0.037025641	0.2525907	0.9535013	51.75867769
520	94	0.8333333	9.591663	16	8	0.031589644	0.2284315	0.960277	55.57884298
519	94	0.875	11.045361	20	9	0.043989395	0.6431051	0.943728	137.5438017
518	94	0.875	8.8317609	18	7	0.027858222	0.4561798	0.9644625	153.1371901
517	94	0.7142857	10.77033	18	8	0.041800834	0.3010339	0.9465368	138.3887603
516	94	0.625	8.7177979	16	7	0.026456355	0.5207315	0.9665393	142.1401653
515	94	0.75	2.4494897	6	1	0.001577486	0.2903947	0.9981986	92.24595041
514	94	0.5714286	6.78233	12	5	0.015717357	0.3174273	0.9802304	50.23338843
513	94	0.5555556	23.537205	40	20	0.215947569	0.5640112	0.7163217	75.21322314
504	94	0.5714286	22.045408	34	16	0.17339363	0.3309436	0.7788719	86.56066116
503	94	0.5714286	20.639767	32	15	0.153467884	0.3309436	0.8037439	74.7292562
502	94	0.5714286	17.832555	28	13	0.116019045	0.3309436	0.8510767	56.18380165
501	94	0.5714286	15.033296	24	11	0.08267536	0.3309436	0.8937819	44.4614876
500	94	0.5714286	8.1240384	14	6	0.02303826	0.3174273	0.9708266	45.00694215
499	94	0.5714286	5.4772256	10	4	0.009978264	0.3174273	0.9875555	57.16561983
498	94	0.5714286	5.4772256	10	4	0.009978264	0.3174273	0.9875555	57.16561983
497	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
496	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
495	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
494	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
493	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
492	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
491	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
490	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
489	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
488	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
487	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
486	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
485	94	0.4285714	2.4494897	4	2	0.002076248	0.3174273	0.9973748	101.9523967
456	94	0.75	14.142136	24	12	0.071627523	0.2619655	0.9087776	32.89719008
455	94	0.5714286	19.235384	30	14	0.134296796	0.3309436	0.8278832	64.60363636
454	94	0.5714286	20.639767	32	15	0.153467884	0.3309436	0.8037439	74.7292562
453	94	0.5714286	22.045408	34	16	0.17339363	0.3309436	0.7788719	86.56066116
452	94	0.5714286	23.452079	36	17	0.193934919	0.3309436	0.7534741	100.0978512

CONCLUSION

Path detection for moving objects such as positioning is vital for project success, with the development of machine learning approaches, the process of positioning are become more feasible and more accurate. In this project, path detection of moving objects is being made in order to avoid the collisions of the robots. Simulation of the same was performed in Matlab and this experiment, eight similarity measurement techniques were used for identifying the moving oath of the object namely Jaccard, Euclidean, Cityblock, Chebychev, Cosine, Correlation and Validation. The results shown that total consumption time (which was used as performance metric to judge the used algorithms) is maximum with Spearman method which was equal to 000661 seconds whereas it is far less when Correlation method is used (equal to 000234 second).

REFERENCES

[1] T. Jeyaprakash, "A Tactical Information Management System for Unmanned Vehicles Using Vehicular Adhoc Networks," 2013 4th International Conference on Intelligent Systems, Modelling and Simulation, IEEE, 2013.
[2] N. Islam, " A Novel Approach to Service Discovery in Mobile AdhocNetwork," 978-1-4244-2152-7/08/$25.OO©C2008IEEE.
[3] P. Tomer, "An Application of Routing Protocols for Vehicular Ad-hoc Networks," 201O International Conference on Networking and Information Technology, IEEE.
[4] A. Nayyar, "Flying Adhoc Network (FANETs): Simulation Based Performance Comparison of Routing Protocols: AODV, DSDV, DSR, OLSR, AOMDV and HWMP," 978-1-5386-3060-0/18/$31.00 ©2018 IEEE.
[5] V. K. Tripathi, "Secure Communication with Privacy Preservation in VANET- Using Multilingual Translation," Proceedings of 2015 Global Conference on Communication Technologies(GCCT 2015), IEEE.

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[6] N. Karyemsetty, "Design and Deployment of Vehicle Tracking System in VANETs using Xbee Pro: Prototype Model," 2015 International Conference on Communication Networks (ICCN), IEEE.
[7] A. Rahim, "Relevance Based Approach with Virtual Queue for Vehicular Adhoc Networks," COMSATS Institute of Information Technology, Islamabad, Pakistan & IEEE.
[8] P. S. A. Bharath, "Collision Avoidance System in Vehicular Adhoc Network Utilizing Dichotomized Headway Model," 2014 International Conference on Circuit, Power and Computing Technologies [ICCPCT], IEEE.
[9] Y. K. S. I. R. S. S. O. Eiji Takimoto, "Evaluation of Multi-Channel Flooding for Inter-Vehicle Communication," IEEE International Conference on Advanced Information Networking and Applications .
[10] V. B. Vaghela, "Novel Routing Protocol for Vehicular Adhoc Networks," 2012 2nd IEEE International Conference on Parallel, Distributed and Grid Computing.
[11] F.-Y. Tan, "The Network Capacity Issues on Designing Routing Protocol of Vehicular Ad hoc Network," 978-1-4673-6850-6/15 $31.00 © 2015 IEEE DOI 10.1109/ICISCE.2015.117.
[12] K.-I. K. Beom-Su Kim, "Hierarchical Routing for Unmanned Aerial Vehicle Relayed Tactical Ad Hoc Networks," 2018 IEEE 15th International Conference on Mobile Ad-hoc and Sensor Systems, IEEE.
[13] T. A. KUMAR, "A Reliable Path Selection For Vehicular Adhoc Network Using Reliability Matrix and Connectivity Matrix," IEEE International Conference on Engineering and Technology (ICETECH), 17th& 18thMarch 2016, Coimbatore, TN, India.
[14] H.-W. W. Tseng-Yi Chen∗ , "An Efficient Routing Algorithm to Optimize the Lifetime of Sensor Network Using Wireless Charging Vehicle," IEEE 11th International Conference on Mobile Ad Hoc and Sensor Systems.
[15] J. L. Joey Anda1, "VGrid: Vehicular AdHoc Networking and Computing Grid for Intelligent Traffic Control," 0-7803-8887-9/05/$20.00 (c)2005 IEEE.
[16] M. I. H. Zannatul Naim, "Performance Analysis of AODV, DSDV And DSR in Vehicular Adhoc Network(VANET)," IEEE International Conference on Robotics,Electrical and Signal Processing Techniques (ICREST).
[17] Y. L. M. Z. W. Wang, "Intermittently Connected Vehicle-to-Vehicle Networks: Detection and Analysis," IEEE Communications Society subject matter experts for publication in the IEEE Globecom 2011 proceedings..
[18] K. Singh, "Threat Modeling for Multi-UAV Adhoc Networks," Proc. of the 2017 IEEE Region 10 Conference (TENCON), Malaysia, November 5-8, 2017.

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