VIZAFRICA 2019 DATA VISUALIZATION SYMPOSIUM

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Theme/ Topic: "Application of Data, Information, and Scientific Visualization for Resource Management and Sustainability" based On Data Analytics, Visualization, Internet of Things (IoTs).

Introduction

Visualization is a graphical representation of abstract data with the purpose of computing inside node numbers using plotting techniques. We need visualization as we live in an era of big data and with such data it is easier to activate our brain for interpreted data using graphs, trees, etc. It enables identification and interpretation of system states using graphical views. Visualization also facilitates adaptation by increasing participation of citizens within a country as citizens tend to think scientifically using open data. It is very useful though proper IT infrastructure is very pricey hence Africa as a whole is left behind in the digital world. It is also a game changer, has the potential to save a company a lot of money though an error or wrong prediction can be very costly.

Knowledge/ Learning Acquired

Why we need visualization in developing countries is to improve service delivery and how to look at co existing data to achieve service delivery. We have very restrictive budgets so visualization of corruption or malefactions can be minimized by distributive technologies. With business intelligent systems most of them are not real-time hence the information is not instant. We need to visualize and use that data so natural disasters like flooding are predicted in order to save lives and make the country competitive in the digital world by improving service delivery.

From the business aspect of things the average time in which one finds out that something has happened within the business or company is basically sixty eight days, so visualizing can help reduce this to a minimum of zero days by finding out when it happens very quickly provided the data is given.

In Botswana our identification card number, license card and passport have the same identification number hence duplication of data across different platforms. If we take a single string of data and start multiplying it across different platforms and create a block chain node, the University of Botswana(as a block chain node) to aggregate information from business, commercial side and the public sector all in one engine and use the youth developers talent to create applications to utilize

the single call. Then costs will be minimized and the democracy in governments will be very conservative in most cases and become a powerful engine for change.

Sustainable development 13, climate, health, agricultural policies and resource management are a challenge therefore we are looking forward to action building resilience for the country through the global movement, to advanced and open science fair in the sense that we promote data to be in the format called fair inter operable, accessible and re-usable data. If data is stored in that format it becomes a lot easier to make advanced development and innovation. The challenges of the globe global warming, the hoax disease are becoming difficult to deal with therefore collaborative tools are needed to understand how these transmissions happen. Food security is also increasing and harnessed data should be fused and put together to make better decisions. We need data to make decisions by visualizing (and streaming data as the eye easily interprets).

If you take for example there is a wealthy family that is said to have stolen money from its neighboring country and managed to exhibit. One of the reasons why they managed to steal the money is that we do not have visualization of the foreign exchange transactions that were taking place over the period of time that the malefactions took place. Now if developing countries national reserve bank, revenue or national treasures authorities visualize how many transactions are taking place on forex at this particular point in time then crime world be monitored and reduced.

Visualization for improved examination timetabling, Wame Raseonyana et al

Using visualization for an improved examination timetable, both hard and soft constraints should be considered when scheduling, no examinations enrolled for the same program should clash, the number of students with two examinations per day should be minimized hence the relationship between examinations should be known. Algorithms can be visualized at different stages of scheduling, during the timetable preparation, be it pre scheduling, post scheduling and during scheduling to minimize costs when seeking for solution. Preprocessing data visualization uses open source network tools used for network structures. Different nodes (exams), edges between two nodes (student in common) so we can't schedule or process examinations at the same time. Importance of visualizing algorithms is that we can have different algorithms that can work for the data set to find the one with a minimum cost and resolution which will work best.

The performance evaluation of mobility models on AODV and OLSR using network simulator (NS3) Mildred J Nwonye et al

In MANET there are various routing protocols, rules that govern the way of packets are sent from the source to the final destination.in networking there are two types of networks; infrastructure and infrastructure less networks. MANET happen to be an infrastructure less network in which the nodes have no access points. A MANET is a self-configuring network as any node can act as a controller and nodes are flexible with moving in and out of the network, as a result the topology becomes dynamic. They can be applied in various sectors such as commercial sectors using various routing protocols such as the reactive and proactive routing protocols. Under the reactive routing

protocols we have the AODV where routes are gotten when only needed at a specific time hence when a source node wants to send a packet it initiates a route discovery and the route discovery floods the network with the route request in order to send something to the destination. With the proactive routing protocol the routing table is used which is regularly updated containing information about the network topology. The mobility model is used to describe the way mobile nodes move in the network and the mobility nodes used for the impact of network size on throughput and energy consumption of a MANET utilizing AODV. The random way point mobility model uses pause time to change direction and the speed of the nodes as nodes move from one specific direction to another. During the pause time the node is basically trying to find a new destination until the final destination is reached. The random directional mobility model was created to reduce the density in the average number of neighbors found. The density reduced the packets being posted to one place. This project was conducted using the NS3 simulation which is an open source tool. In conclusion when the random directional mobility speed increases throughput also increases. When the nodes are increased the throughput stays the same, the package delivery ratio is very successful hence better performance.

The impact of network size on the throughput and energy consumption of a MANET utilizing AODV, Emmanuela AW Budu et al

MANET is a mobile autonomous system of self-configuring nodes connected wirelessly for the purpose of communication for example cellphones, patient monitoring systems and so fourth. MANETS have become a popular research area because we moving from infrastructure networks to infrastructure less networks for example we can have nodes communication in the conference without any access points. Some of the characteristics of AODV is that it uses route discovery, routes request packets and route reply packets to discover routes between nodes. If one has the source node A and A wants to communicate with destination node F. Node A propagates route packets to its neighbors and the neighbors broadcast too and once the destination is found route reply packets are sent to node A(node F is available for communication). MANET use route error packets to notify the nodes of the network when there is a path failure. It also uses hello packets to maintain connectivity between the nodes in the network.

Throughput is the sum of packets sent over time taken to receive (bits/second). Energy is the amount of power consumed in the network (battery powered). NS3 is an open source simulation tool that allows visualization of the network to model the network and allows one to send packets across the network. The parameter set for the simulator was 15 to 50 nodes which for were used to mimic the behavior of the actual Random Way Point mobility model. For 10 nodes, throughput agsainst size the throughput was low. Increasing the size of the nodes to 50 the throughput increases. This is because more nodes are available for communication. As for Energy consumption with 10 nodes energy consumed is low, more nodes more energy is required because more nodes means more intermediary nodes to communicate with which means more energy in the network. Values of throughput require more energy in an ADHOC network ADHOC sends fewer packets when the network size is smaller. Increase in the network size then more packets are

sent across the network. Increase in network size increases the throughput and more energy is required when the size of the network is increased. Safely for this study the network size between 30 and 40 nodes is the optimal network size because this is when higher values of the throughput are obtained without consuming too much energy.

Conclusion

Data visualization is a coherent way to visually communicate quantitative content. Depending on its attributes, the data may be represented in many different ways, such as a line graph, bar chart, pie chart, scatter plot, or map. Data visualizations should be useful, visually appealing and never misleading. Big data is useless if it can't be comprehended and consumed in a useful way. That's why data visualization plays an important role in everything from economics to science and technology, to healthcare and human services. By turning complex numbers and other pieces of information into graphs, content becomes easier to understand and use (Edward R. Tufte,). As beneficial as visualization is, are we ready to put measures in place to stimulate and implement it as a country or its all talk and no action, workshop after workshop and no implementation done?