

Algorithm is 'game-changer' for picking up on insurance fraud

May 15 2018



Jiawen Sun, Queen's University Belfast Ph.D. student with Dr. Hans Vandierendonck. Credit: Queen's University Belfast

A Queen's University Belfast student has developed software which can detect insurance fraud quickly.

Jiawen Sun, a Ph.D. student in the School of Electronics, Electrical Engineering and Computer Science and the Institute of Electronics, Communications and Information Technologies (ECIT) at Queen's, has been working for the last three years to create a software system which can efficiently analyse graph-structured data.

In sifting through an organisation's data, the software can rapidly detect insurance fraud.

Jiawen Sun, who is from Tianjin, China, explains: "Organisations are collecting increasing amounts of data, which is usually represented by graphs and can be useful for detecting fraud. However, as [data sets](#) grow into the trillions of bytes and beyond, this creates problems in high-performance computing, making it very hard to use the computer at full capacity.

"The algorithm I have created means that we can now process this information quickly and efficiently, enabling organisations to tackle issues such as insurance fraud."

Through her research, Jiawen studied how to lay out the data in a computer's memory and how to assign parts of the computation to different processors.

She also came up with two solutions to change the order of how the data is processed, which allows the computer to be used to its full capacity. The first solution changes the order in which graph edges are processed, splitting the graph in a way where there is no interference between processors, making the process more efficient. The second solution changes the order of processing vertices, allowing analysis to be completed faster.

Dr. Hans Vandierendonck, who was supervisor of the project, says the

findings will have a positive impact for many organisations across the globe.

"Jiawen's work is extremely valuable for many organisations who are processing large volumes of data. These techniques accelerate graph analytics up to 10-fold, which is a game changer for many organisations, allowing them to tap into analysis that they have never used before and at a much faster pace."

Jiawen's work outperforms many state-of-the-art works including the Apache Open Source projects GraphX (Spark) by 21x, Giraph by 55x and GraphLab by 37x. It outperforms the academic systems GraphChi (EPFL) by 1386x, and Ligra (Carnegie Mellon University) by 3x, when calculating the importance and popularity of web sites in the .uk domain using Google's PageRank algorithm.

Jiawen recently received a Silver medal at the Association for Computing Machinery Student Research Competition, which is sponsored by Microsoft. The award offers a unique forum for undergraduate and graduate students to present their original research before a panel of judges and attendees at well-known conferences.

Provided by Queen's University Belfast

Citation: Algorithm is 'game-changer' for picking up on insurance fraud (2018, May 15)
retrieved 19 April 2024 from <https://phys.org/news/2018-05-algorithm-game-changer-fraud.html>

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