

Patent Points

NOW STARTING MY 28TH YEAR...

Inventor Violates On-Sale Bar, Pays 5M\$

US Patent law gives inventors a 1-year grace period to file their patent. The 1-year period often begins when an inventor makes a public disclosure, such as by publishing a paper, or advertising the product for sale. Sometimes inventors use NDA's to avoid public disclosure. However, the 1-year period also begins when any product using the invention is "on-sale", even if the sale is secret or only an offer.

When an inventor violates the 1-year rule, the typical remedy is that the patent is declared invalid. It is considered "Inequitable Conduct", a type of fraud, for an inventor not to tell the patent examiner that he sold the invention more than a year before the filing date.

In the case of Heat-On-The-Fly LLC, the inventor had performed about 2 M\$ in jobs more than a year before his filing date, but did not disclose these sales. Later, the patent issued and the company sued others, including Marathon Oil, and the case and its appeals dragged on for 9 years. The court found that the inventor violated the 1-year on-sale

bar and invalidated the patent.

However, since the inventor knew the patent was invalid due to the on-sale bar, yet he still filed the lawsuits, the court saw this as "egregious conduct" and an "exceptional case" and ordered the inventor's company to pay the other side's legal fees, about 5 M\$.

US Judge rules AI Cannot be a Patent "Inventor"

Artificial Intelligence (AI) and Neural Networks have exploded in popularity, and I'm seeing more and more AI-related inventions. While AI is adept at finding patterns in videos, images, and other large datasets, computers and AI machines are considered to lack human creativity, such as the ability to conceive inventions.

The US Patent Office and a US District judge have both ruled that a patent application submitted by an AI "creativity machine" can be rejected since only people, not machines, can be an inventor

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under existing US law.

Stephen Thaler applied for several patents on behalf of his AI machine DABUS. The AI machine autonomously came up with ideas for patents such as a beverage container with walls having profiles based on fractals. While Stephen Thaler is listed as the applicant, the inventor is listed as:

“DABUS, The invention was autonomously generated by an artificial intelligence.”

You might ask, why doesn't Stephen Thaler just patent the DABUS machine ? Actually, he has several AI patents including “Device system for the autonomous generation of useful information” and “Neural Network Based Rating System”. Perhaps attempting to claim his AI machine as the sole inventor is intended in part to increase publicity for his AI machine.

World's First Patent for an AI-Generated Invention without Human Inventor

Although the US and UK are rejecting the patent application, the AI machine DABUS was already granted a patent in South Africa. This is thought to be the world's first patent having an AI machine listed as the inventor without any human inventor being listed. Also, a judge in Australia ruled that the AI machine could get a patent in Australia.

While the South Africa patent is the World's first patent having an AI inventor without any human inventors listed, it is likely that other patents have been

granted to humans that have used AI to generate or enhance their ideas.

90% Success Rate

Overall, 90% of the patents I have written have been allowed. I have written 585 issued patents, including continuations and divisionals, but have lost only 66 cases in 27 years. When looking at only original cases, excluding continuations and divisionals, I have 538 Issued cases and 60 lost cases, again a 90% success rate.

My success rate for the last 5 years, from Oct. 2016 to Oct. 2021, is a little bit better, at 92%. I've had 54 original cases issue, but had 5 original cases finally rejected. Another 5 continuations and divisionals have issued during that time.

My current 90% success rate is consistent with the last three times I calculated my statistics, in 2016, 2006, and in 1997. From 1994 to 2016, my success rate was 90%. From 1994 to 2006, my success rate was higher, at 95%, and from 1994 to 1997 my success rate was lower, at 84%.

Patent of the Year

My informal “Patent of the Year” is shown on the next page. A Neural Network Accelerator stores node that are quantized and encoded to reduce node complexity. A histogram analyzer reduced quantization bias by adjusting intervals between quantized weights.

Despite being in the complex field of Artificial Intelligence (AI), this patent issued only 15 months after its filing date.

Congratulations to the inventors !



US010872295B1

(12) **United States Patent**
Liu et al.

(10) **Patent No.:** **US 10,872,295 B1**
(45) **Date of Patent:** **Dec. 22, 2020**

(54) **RESIDUAL QUANTIZATION OF BIT-SHIFT WEIGHTS IN AN ARTIFICIAL NEURAL NETWORK**

2018/0232621 A1 8/2018 Du et al.
2018/0307950 A1 10/2018 Nealis et al.
2018/0314940 A1 11/2018 Kundu et al.

(71) Applicant: **Hong Kong Applied Science and Technology Research Institute Company, Limited**, Hong Kong (HK)

FOREIGN PATENT DOCUMENTS

CN 105760933 A 7/2016
CN 106779050 A 5/2017
CN 108647779 A 10/2018
CN 110210621 A 9/2019

(72) Inventors: **Yu Liu**, Hong Kong (HK); **Xuejiao Liu**, Shenzhen (CN); **Luhong Liang**, Hong Kong (HK)

OTHER PUBLICATIONS

(73) Assignee: **Hong Kong Applied Science and Technology Institute Company, Limited**

Walsh, Design and Implementation of Massively Parallel Fine-Grained Processor Arrays, Doctoral Thesis, University of Manchester, 2014, pp. 1-207 (Year: 2014).*
ISR and Written Opinion, PCT/CN2019/111276, dated Jun. 18, 2020.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

* cited by examiner

(21) Appl. No.: **16/575,421**

Primary Examiner — Wilbert L Starks
(74) *Attorney, Agent, or Firm* — Stuart T. Auvineng Patent LLC

(22) Filed: **Sep. 19, 2019**

(51) **Int. Cl.**
G06N 3/063 (2006.01)
G06F 7/544 (2006.01)

(57) **ABSTRACT**

(52) **U.S. Cl.**
CPC **G06N 3/063** (2013.01); **G06F 7/5443** (2013.01)

A neural network accelerator reads encoded weights from memory. All 1 bits in a weight except the first three are discarded. The first three leading 1 bits in the weight are encoded as three bit-shift values to form the encoded weight. The three bit-shift values are applied to a bit shifter to shift a node input to obtain three shifted inputs that are accumulated to generate the node output. Node complexity is reduced since only 3 shifts are performed rather than up to 15 shifts for a 16-bit weight. The bit shifter and accumulator for a node can be implemented by Look-Up Tables (LUTs) without requiring a Multiply-Accumulate (MAC) cell in a Field-Programmable Gate Array (FPGA). Quantization bias is reduced using a histogram analyzer that determines a weighted average for each interval between quantized weights. The third bit-shift value is incremented for weights in the interval above the weighted average.

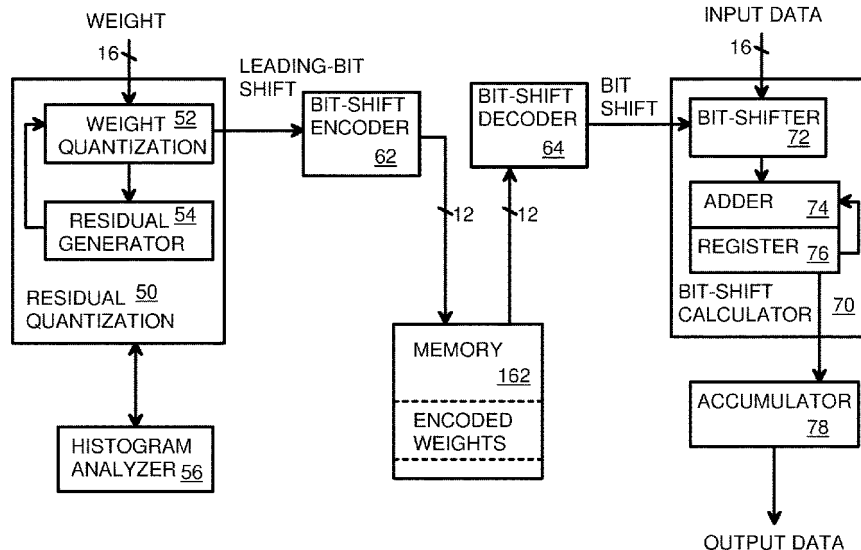
(58) **Field of Classification Search**
None
See application file for complete search history.

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7,730,118 B2 6/2010 Kurd
10,089,577 B2 10/2018 Umuroglu
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2017/0243110 A1 8/2017 Esquivel et al.

20 Claims, 12 Drawing Sheets



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563 Patents Issued

After 27 years of writing patents as a full-time Patent Agent, 563 applications that I've written have now issued as patents. Congratulations inventors!

You can view the 563 issued patents I've written at:

www.gpatent.com

Rates Set for 2022

My hourly rate for 2022 will be \$340 per hour, billed in quarter-hour increments. Fixed-price quotes are available for patent applications to facilitate budgeting and avoid expensive surprises.

Prosecution work such as amendments and other paperwork is billed at the hourly rate. Litigation-support work is billed at a higher rate. Patent searches are billed at a flat \$500 for U.S. abstract searches. Patents can be viewed on-line.

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Address Correction Requested