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The Statistical Force in the Worldwide Performance of the Healthcare Applications, Concerning 3D Printing and the Artificial Intelligence

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ABSTRACT

3D Printing confers the construction of the radiant future in medicine and whole 3D Printing list concerning the healthcare material displays the energetic sources for the health people. 3D Printing reflects a huge efficiency in orthopaedy. There are impressive discoveries in this domain of the medicine: bionic hands, prosthesises, knees pans and whole 3D Printing "treasure" of health emanates energies which drive to the rise of the life expectancy. The applications for the healthcare regarding the artificial intelligence assure modalities with effectiveness through precision for to rise the healthcare at a high level. There are a lot of 3D Printing in healthcare: synthetic skin, prosthesises from titanium, cardiac models such as heart valves, hearts, cartilages for ears, electronic sensors wrapped in silicon which can be introduced in human hearts, tissues which contain blood vessels. The prosthetic appliances for patients were created at Toronto University, the tissues which include blood vessels were produced at Harvard University and the electronic sensors for human hearts were printed at Washington University.

1. Introduction

The fascinating applications concerning 3D printing in orthopaedy, which are focused on the musculoskeleton system, are amazing. In this direction, we can „explore": 3D printed leg brace, 3D printed bionic skeleton hand, controllable robotic hand with flex sensors, youbionic 3D double hand, which has as motto: „three hands are better that one". This original statistical exploration designs the trajectories of the functions concerning the values of 3D Printing and the artificial intelligence in the worldwilde healthcare. The first part models the trend of the wealth of informations concerning 3D Printing in the worldwide healthcare. In the second part, we can see the construction of the model which reflects the wealth of informations regarding the artificial intelligence in the worldwide healthcare and in the third part we can observe that in the eyes of the performance lovers, the powerful magnetic influence of 3D Printing in the worldwide healthcare, concerning the hardwares, materials and softwares, is equivalently with the „tsunami of energy" achieved by the „accelerator of particles". For to display the demonstration of the special progress which it achieves in Healthcare concerning 3D Printing in worldwide, the method applied is constituted by the „Least Squares Method". In 1823, Johann Carl Friedrich Gauss achieved the „Least Squares Method" which it uses for to highligh the configuration of the statistical modeling.

2. The model of 3D Printing in Healthcare at the worldwide level

We can focus the impressive and powerful architecture of the statistical data regarding the evolutions of 3 D Printing in Worldwide Healthcare, in the next display:

Table 1 The worldwide values of 3D Printing in Healthcare, between 2015-2018

YEARS	3D PRINTING IN HEALTHCARE AT THE WORLDWIDE LEVEL (billions $), (ξ_i)
2015	520
2016	660
2017	795
2018	935

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Source: „Statista Portal United States of America"

- if the „style" of the modeling for ξ variable, where ξ = **3D Printing in Healthcare** at worldwide level**,** highlights a linear leaning $\xi_{t_i} = a + b \cdot t_i$, *a* and *b* will be [2]:

$$S = \sum_{i=1}^{n}(\xi_i - \xi_{ti})^2 = \min \Leftrightarrow S = \sum_{i=1}^{n}(\xi_i - a - bt_i)^2 = \min$$

$$\begin{cases} \dfrac{\partial S}{\partial a} = 0 \\ \dfrac{\partial S}{\partial b} = 0 \end{cases} \Rightarrow \begin{cases} 2\sum_{1=1}^{n}(\xi_i - a - bt_i)(-1) = 0/(-\frac{1}{2}) \\ 2\sum_{1=1}^{n}(\xi_i - a - bt_i)(-t_i) = 0/(-\frac{1}{2}) \end{cases} \Rightarrow \begin{cases} na + b\sum_{i=1}^{n} t_i = \sum_{i=1}^{n}\xi_i \\ a\sum_{i=1}^{n} t_i + b\sum_{i=1}^{n} t_i^2 = \sum_{i=1}^{n}\xi_i t_i \end{cases} \Rightarrow$$

$$a = \frac{\begin{vmatrix} \sum_{i=1}^{n}\xi_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n}\xi_i t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n}\xi_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n}\xi_i t_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} \qquad b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n}\xi_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n}\xi_i t_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n\sum_{i=1}^{n}\xi_i t_i - \sum_{i=1}^{n} t_i \sum_{i=1}^{n}\xi_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2}$$

Table 2 The "algorithm" concerning the architecture of the „matrix" for the values of the ω variable, if 3D Printing in Healthcare at worldwide level highlights a linear leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE (billions $) (ξ_i)	LINEAR TENDENCY			
		t_i^2	$t_i\xi_i$	$\xi_{t_i} = a + bt_i$	$\lvert\xi_i - \xi_{t_i}\rvert$
2015	**520**	4	-1040	534,5	14,5
2016	**660**	1	-660	631	29
2017	**795**	1	+795	824	29
2018	**935**	4	+1870	920,5	14,5
TOTAL	**2910**	10	965	2910	87

$$a = \frac{\begin{vmatrix} \sum_{i=1}^{n}\xi_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n}\xi_i t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n}\xi_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n}\xi_i t_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{2910 \cdot 10 - 965 \cdot 0}{4 \cdot 10 - 0^2} = 727{,}5$$

$$b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n}\xi_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n}\xi_i t_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n\sum_{i=1}^{n}\xi_i t_i - \sum_{i=1}^{n} t_i \sum_{i=1}^{n}\xi_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{4 \cdot 965 - 2910 \cdot 0}{4 \cdot 10 - 0^2} = 96{,}5$$

$$v_I = \left[\frac{\sum_{i=1}^{n}\left|\xi_i - \xi_{t_i}^I\right|}{n} : \frac{\sum_{i=1}^{n}\xi_i}{n}\right] \cdot 100 = \frac{\sum_{i=1}^{n}\left|\xi_i - \xi_{t_i}^I\right|}{\sum_{i=1}^{n}\xi_i} \cdot 100 = \frac{87}{2910} \cdot 100 = 2{,}99\%$$

- if the „style" of the modeling for ξ variable, where ξ = **3D Printing in the Healthcare** at worldwide level**,** highlights a quadratic leaning $\xi_{t_i} = a + b \cdot t_i + ct_i^2$, *a* and *b* will be [2]:

$$a = \frac{\sum_{i=1}^{n} t_i^4 \sum_{i=1}^{n} \xi_i - \sum_{i=1}^{n} t_i^2 \sum_{i=1}^{n} t_i^2 \cdot \xi_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2} \quad ; \quad b = \frac{\sum_{i=1}^{n} \xi_i t_i}{\sum_{i=1}^{n} t_i^2} \quad ; \quad c = \frac{n \cdot \sum_{i=1}^{n} t_i^2 \cdot \xi_i - \sum_{i=1}^{n} t_i^2 \cdot \sum_{i=1}^{n} \xi_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2}$$

Table 3 The "algorithm" concerning the architecture of the „matrix" for the values of the ω variable, if 3D Printing in Healthcare at worldwide level highlights a quadratic leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE (billions $) (ξ_i)	PARABOLIC TENDENCY				
		t_i^2	t_i^4	$t_i^2 \xi_i$	$\xi_{t_i} = a + b\xi_i + c\xi_i^2$	$\lvert \xi_i - \xi_{t_i} \rvert$
2015	**520**	4	16	2080	534,5	14,5
2016	**660**	1	1	660	631	29
2017	**795**	1	1	795	824	29
2018	**935**	4	16	3740	920,5	14,5
TOTAL	**2910**	10	34	7275	2910	87

$$a = \frac{\sum_{i=1}^{n} t_i^4 \sum_{i=1}^{n} \xi_i - \sum_{i=1}^{n} t_i^2 \sum_{i=1}^{n} t_i^2 \cdot \xi_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2} = \frac{34 \cdot 2910 - 10 \cdot 7275}{4 \cdot 34 - 10^2} = 727{,}5$$

$$b = \frac{\sum_{i=1}^{n} \xi_i t_i}{\sum_{i=1}^{n} t_i^2} = \frac{965}{10} = 96{,}5$$

$$c = \frac{n \cdot \sum_{i=1}^{n} t_i^2 \cdot \xi_i - \sum_{i=1}^{n} t_i^2 \cdot \sum_{i=1}^{n} \xi_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2} = \frac{4 \cdot 7275 - 10 \cdot 2910}{4 \cdot 34 - 10^2} = 0$$

$$v_{II} = \left[\frac{\sum_{i=1}^{n} \left| \xi_i - \xi_{t_i}^I \right|}{n} : \frac{\sum_{i=1}^{n} \xi_i}{n} \right] \cdot 100 = \frac{\sum_{i=1}^{n} \left| \xi_i - \xi_{t_i}^I \right|}{\sum_{i=1}^{n} \xi_i} \cdot 100 = \frac{87}{2910} \cdot 100 = 2{,}99\%$$

- if the „style" of the modeling for ξ variable, where ξ **= 3D Printing in Healthcare** at worldwide level**,** highlights an exponential leaning $\xi_{t_i} = ab^{t_i}$, *a* and *b* will be [2]:

$$\lg a = \frac{\begin{vmatrix} \sum_{i=1}^{n} \lg \xi_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i \lg \xi_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n} \lg \xi_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n} t_i \lg \xi_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} \qquad \lg b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n} \lg \xi_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i \lg \xi_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n \cdot \sum_{i=1}^{n} t_i \lg \xi_i - \sum_{i=1}^{n} \lg \xi_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2}$$

Table 4 The “algorithm” regarding the architecture of the „matrix” for the values of the ω variable, if 3D Printing in Healthcare at worldwide level highlights an exponential leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE (billions $) (ξ_i)	EXPONENTIAL TENDENCY				
		$\lg \xi_i$	$t_i \lg \xi_i$	$\lg \xi_{t_i} = \lg a + t_i \lg b$	$\xi_{t_i} = ab^{t_i}$	$\lvert \xi_i - \xi_{t_i} \rvert$
2015	**520**	2,716003344	-5,432006687	2,839872711	691,6282293	171,6
2016	**660**	2,819543936	-2,819543936	2,792637533	620,3510662	39,6
2017	**795**	2,900367129	+2,900367129	2,910725477	814,1894619	19,2
2018	**935**	2,970811611	+5,941623222	2,969769449	932,7590018	2,2
TOTAL	**2910**	11,40672602	0,590439728			232,6

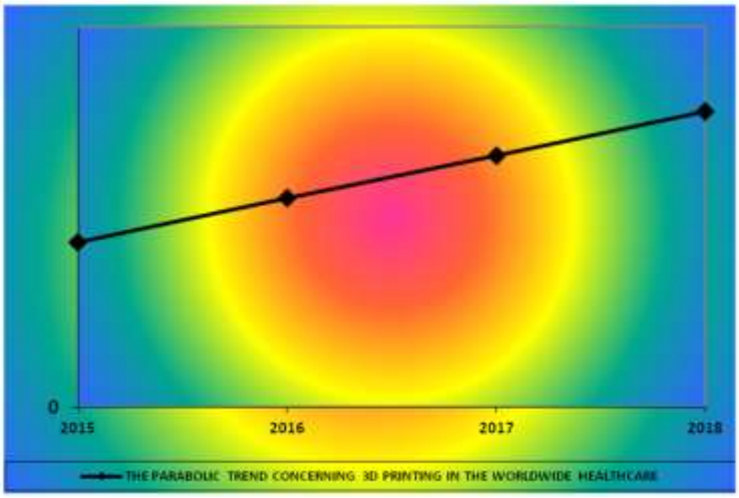
$$\lg a = \frac{\begin{vmatrix} \sum_{i=1}^{n} \lg \xi_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i \lg \xi_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n} \lg \xi_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n} t_i \lg \xi_i \sum_{i=1}^{n} t_i}{n \sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i \right)^2} = \frac{11{,}40672602 \cdot 10 - 0{,}590439728 \cdot 0}{4 \cdot 10 - 0^2} = 2{,}851681505$$

$$\lg b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n} \lg \xi_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i \lg \xi_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n \cdot \sum_{i=1}^{n} t_i \lg \xi_i - \sum_{i=1}^{n} \lg \xi_i \sum_{i=1}^{n} t_i}{n \sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i \right)^2} = \frac{4 \cdot 0{,}590439728 - 11{,}40672602 \cdot 0}{4 \cdot 10 - 0^2} = 0{,}059043972$$

$$v_{exponential} = \left[\frac{\sum_{i=1}^{n} \lvert \xi_i - \xi_{t_i}^{I} \rvert}{n} : \frac{\sum_{i=1}^{n} \xi_i}{n} \right] \cdot 100 = \frac{\sum_{i=1}^{n} \lvert \xi_i - \xi_{t_i}^{I} \rvert}{\sum_{i=1}^{n} \xi_i} \cdot 100 = \frac{232{,}6}{2910} \cdot 100 = 7{,}99\%$$

$$v_{II} = 2{,}99\% < v_{exponential} = 7{,}99$$

The best „style” regarding the leaning for **3D Printing in the Worldwide Healthcare**, follows a parabolic trend $\xi_{t_i} = a + b \cdot t_i + ct_i^2$



Graph 1 The parabolic tendency which is displayed by 3D Printing in the Worldwide Healthcare

$$\xi_{2019}^{3DPRINTING} = 727{,}5 + 96{,}5 \cdot 3 + 0 \cdot 3^2 = 1017 \text{ billions } \$$$

$$\xi_{2020}^{3DPRINTING} = 727{,}5 + 96{,}5 \cdot 4 + 0 \cdot 4^2 = 1113{,}5 \text{ billions } \$$$

$$\xi_{2021}^{3DPRINTING} = 727{,}5 + 96{,}5 \cdot 5 + 0 \cdot 5^2 = 1210 \text{ billions } \$$$

$$\xi_{2022}^{3DPRINTING} = 727,5 + 96,5 \cdot 6 + 0 \cdot 6^2 = 1306,5 \text{ billions \$}$$
$$\xi_{2023}^{3DPRINTING} = 727,5 + 96,5 \cdot 7 + 0 \cdot 7^2 = 1403 \text{ billions \$}$$
$$\xi_{2024}^{3DPRINTING} = 727,5 + 96,5 \cdot 8 + 0 \cdot 8^2 = 1499,5 \text{ billions \$}$$
$$\xi_{2025}^{3DPRINTING} = 727,5 + 96,5 \cdot 9 + 0 \cdot 9^2 = 1596 \text{ billions \$}$$
$$\xi_{2026}^{3DPRINTING} = 727,5 + 96,5 \cdot 10 + 0 \cdot 10^2 = 1692,5 \text{ billions \$}$$
$$\xi_{2027}^{3DPRINTING} = 727,5 + 96,5 \cdot 11 + 0 \cdot 11^2 = 1789 \text{ billions \$}$$
$$\xi_{2028}^{3DPRINTING} = 727,5 + 96,5 \cdot 12 + 0 \cdot 12^2 = 1885,6 \text{ billions \$}$$
$$\xi_{2029}^{3DPRINTING} = 727,5 + 96,5 \cdot 13 + 0 \cdot 13^2 = 1982 \text{ billions \$}$$
$$\xi_{2030}^{3DPRINTING} = 727,5 + 96,5 \cdot 14 + 0 \cdot 14^2 = 2078,5 \text{ billions \$}$$

3. The modeling of the Artificial Intelligence in the Worldwide Healthcare

Table 5 The values concerning the Artificial Intelligence in the Worldwide Healthcare

YEARS	THE ARTIFICIAL INTELLIGENCE IN THE WORLDWIDE HEALTHCARE (billions USD), (ω_i)
2016	**1098**
2017	**1426**
2018	**2182**
TOTAL	**4706**

Source: „Statista Portal United States of America"

- if the „style" of the modeling for ω variable, where ω=**Artificial Intelligence in the Worldwide Healthcare,** highlights a linear leaning $\omega_{t_i} = a + b \cdot t_i$, *a* and *b* will be [2]:

Table 6 Entity which is focused on the values of the ω variable, if the Artificial Intelligence in the Worldwide Healthcare highlights a linear leaning

YEARS	ARTIFICIAL INTELLIGENCE IN HEALTHCARE (billions USD) (ω_i)	LINEAR TENDENCY				
		t_i	t_i^2	$t_i\omega_i$	$\omega_{t_i} = a + bt_i$	$\lvert \omega_i - \omega_{t_i} \rvert$
2016	**1098**	-1	1	-1098	1026,666667	71,33
2017	**1426**	0	0	0	1568,666667	142,67
2018	**2182**	+1	1	2182	2110,666667	71,33
TOTAL	**4706**		2	1084	4706	285,33

$$a = \frac{\begin{vmatrix} \sum_{i=1}^{n}\omega_i & \sum_{i=1}^{n}t_i \\ \sum_{i=1}^{n}\omega_i t_i & \sum_{i=1}^{n}t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n}t_i \\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n}\omega_i \sum_{i=1}^{n}t_i^2 - \sum_{i=1}^{n}\omega_i t_i \sum_{i=1}^{n}t_i}{n\sum_{i=1}^{n}t_i^2 - \left(\sum_{i=1}^{n}t_i\right)^2} = \frac{4706 \cdot 2 - 1084 \cdot 0}{3 \cdot 2 - 0^2} = 1568,666667$$

$$b=\frac{\begin{vmatrix} n & \sum_{i=1}^{n}\omega_i \\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}\omega_i t_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n}t_i \\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}t_i^{2} \end{vmatrix}}=\frac{n\sum_{i=1}^{n}\omega_i t_i-\sum_{i=1}^{n}t_i\sum_{i=1}^{n}\omega_i}{n\sum_{i=1}^{n}t_i^{2}-\left(\sum_{i=1}^{n}t_i\right)^2}=\frac{3\cdot 1084-0\cdot 4706}{3\cdot 2-0^2}=542$$

$$v_I=\left[\frac{\sum_{i=1}^{n}\left|\omega_i-y_{t_i}^{I}\right|}{n}:\frac{\sum_{i=1}^{n}\omega_i}{n}\right]\cdot 100=\frac{\sum_{i=1}^{n}\left|\omega_i-\omega_{t_i}^{I}\right|}{\sum_{i=1}^{n}\omega_i}\cdot 100=\frac{285{,}33}{4706}\cdot 100=6{,}06\%$$

- if the „style" of the modeling for ω variable, where ω = **Artificial Intelligence in the Worldwide Healthcare**, highlights a quadratic leaning $\omega_{t_i}=a+b\cdot t_i+ct_i^2$, *a* and *b* will be [2]:

Table 7 Entity which is focused on the values of the ω variable, if the Artificial Intelligence in the Worldwide Healthcare highlights a quadratic leaning

YEARS	ARTIFICIAL INTELLIGENCE IN HEALTHCARE (billions USD) (ω_i)	PARABOLIC TENDENCY				
		t_i^3	t_i^4	$t_i^2\omega_i$	$\omega_{t_i}=a+b\xi_i+c\xi_i^2$	$\lvert\omega_i-\omega_{t_i}\rvert$
2016	**1098**	-1	1	1098	1098	0
2017	**1426**	0	0	0	1426	0
2018	**2182**	+1	1	2182	2182	0
TOTAL	**4706**		2	3280	4706	0

$$a=\frac{\sum_{i=1}^{n}t_i^4\sum_{i=1}^{n}\omega_i-\sum_{i=1}^{n}t_i^2\sum_{i=1}^{n}t_i^2\cdot\omega_i}{n\sum_{i=1}^{n}t_i^{4}-\left(\sum_{i=1}^{n}t_i^2\right)^2}=\frac{2\cdot 4706-2\cdot 3280}{3\cdot 2-2^2}=1426$$

$$b=\frac{\sum_{i=1}^{n}\omega_i t_i}{\sum_{i=1}^{n}t_i^{2}}=\frac{1084}{2}=542$$

$$c=\frac{n\cdot\sum_{i=1}^{n}t_i^2\cdot\omega_i-\sum_{i=1}^{n}t_i^2\cdot\sum_{i=1}^{n}\omega_i}{n\sum_{i=1}^{n}t_i^{4}-\left(\sum_{i=1}^{n}t_i^2\right)^2}=\frac{3\cdot 3280-2\cdot 4706}{3\cdot 2-2^2}=214$$

$$v_{II}=\left[\frac{\sum_{i=1}^{n}\left|\omega_i-\omega_{t_i}^{II}\right|}{n}:\frac{\sum_{i=1}^{n}\omega_i}{n}\right]\cdot 100=\frac{\sum_{i=1}^{n}\left|\omega_i-\omega_{t_i}^{II}\right|}{\sum_{i=1}^{n}\omega_i}\cdot 100=\frac{0}{4706}\cdot 100=0\%$$

- if the „style" of the modeling for ω variable, where ω = **Artificial Intelligence in the Worldwide Healthcare**, highlights an exponential leaning $\omega_{t_i}=ab^{t_i}$, *a* and *b* will be [2]:

Table 8 Entity which is focused on the values of the ω variable, if the Artificial Intelligence in the Worldwide Healthcare highlights an exponential leaning

YEARS	ARTIFICIAL INTELLIGENCE IN HEALTHCARE (billions USD) (ω_i)	EXPONENTIAL TENDENCY					
		$\lg\omega_i$	t_i	$t_i \lg\omega_i$	$\lg\omega_{t_i} = \lg a + t_i \lg b$	$\omega_{t_i} = ab^{t_i}$	$\lvert\omega_i - \omega_{t_i}\rvert$
2016	**1098**	3,04060234	-1	-3,04060234	3,028732668	1068,39702	29,6
2017	**1426**	3,154119526	0	0	3,177858871	1506,117556	80,12
2018	**2182**	3,338854746	+1	+3,338854746	3,326985074	2123,171491	58,83
TOTAL	**4706**	9,533576612		0,298252406			168,55

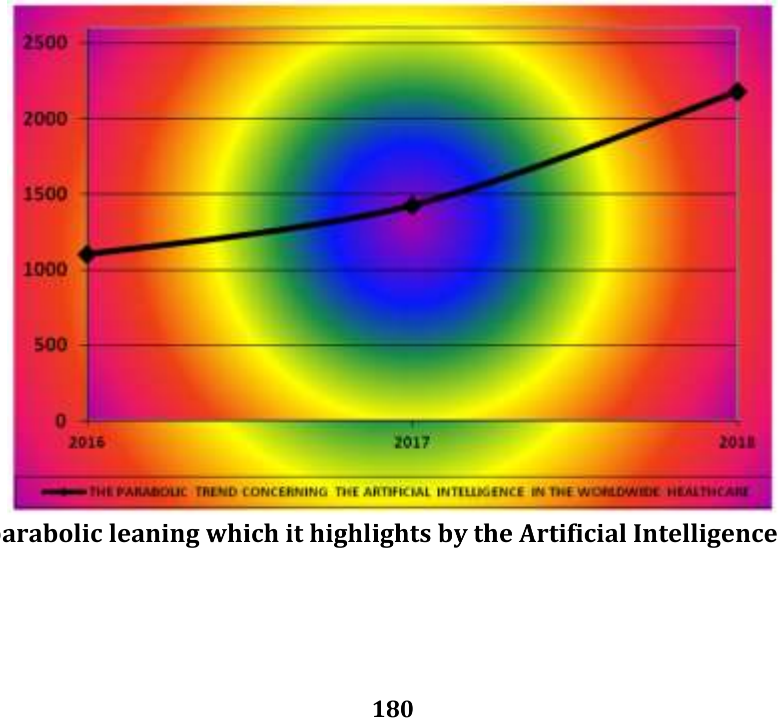
$$\lg a = \frac{\begin{vmatrix} \sum_{i=1}^{n} \lg\omega_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i \lg\omega_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n} \lg\omega_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n} t_i \lg\omega_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{9{,}533576612\cdot 2 - 0{,}298252406\cdot 0}{3\cdot 2 - 0^2} = 3{,}17685887$$

$$\lg b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n} \lg\omega_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i \lg\omega_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n\cdot\sum_{i=1}^{n} t_i \lg\omega_i - \sum_{i=1}^{n} \lg\omega_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{3\cdot 0{,}298252406 - 9{,}533576612\cdot 0}{3\cdot 2 - 0^2} = 0{,}1491262$$

$$v_{\exp} = \left[\frac{\sum_{i=1}^{n}\lvert\omega_i - \omega_{t_i}^{\exp}\rvert}{n} : \frac{\sum_{i=1}^{n}\omega_i}{n}\right]\cdot 100 = \frac{\sum_{i=1}^{n}\lvert\omega_i - \omega_{t_i}^{\exp}\rvert}{\sum_{i=1}^{n}\omega_i}\cdot 100 = \frac{168{,}55}{4706}\cdot 100 = 3{,}58\%$$

$$v_{II} = 0\% < v_{\exp onential} = 3{,}58\% < v_I = 6{,}06\%$$

The best „style" concerning the tendency for the **Artificial Intelligence in the Worldwide Healthcare** is around of the parabolic leaning $\omega_{t_i} = a + b\cdot t_i + ct_i^2$ for ω variable, where ω= **Artificial Intelligence in the Worldwide Healthcare**, equivalent with the graph 2.



Graph 2 The parabolic leaning which it highlights by the Artificial Intelligence in Healthcare

$$\omega_{2019}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 3 + 214 \cdot 3^2 = 4978 \text{ billions \$}$$
$$\omega_{2020}^{ARTIFICIAL\_INTELLIGENCE\_HEALTCARE} = 1426 + 542 \cdot 4 + 214 \cdot 4^2 = 7018 \text{ billions \$}$$
$$\omega_{2021}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 5 + 214 \cdot 5^2 = 9486 \text{ billions \$}$$
$$\omega_{2022}^{ARTIFICIAL\_INTELLIGENCE\_HEALTCARE} = 1426 + 542 \cdot 6 + 214 \cdot 6^2 = 12382 \text{ billions \$}$$
$$\omega_{2023}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 7 + 214 \cdot 7^2 = 15706 \text{ billions \$}$$
$$\omega_{2024}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 8 + 214 \cdot 8^2 = 19458 \text{ billions \$}$$
$$\omega_{2025}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 9 + 214 \cdot 9^2 = 23638 \text{ billions \$}$$
$$\omega_{2026}^{ARTIFICIAL\_INTELLIGENCE\_HEALHCARE} = 1426 + 542 \cdot 10 + 214 \cdot 10^2 = 28246 \text{ billions \$}$$
$$\omega_{2027}^{ARTIFICIAL\_INTELLIGENCE\_HEALHCARE} = 1426 + 542 \cdot 11 + 214 \cdot 11^2 = 33282 \text{ billions \$}$$
$$\omega_{2028}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 12 + 214 \cdot 12^2 = 38746 \text{ billions \$}$$
$$\omega_{2029}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 13 + 214 \cdot 13^2 = 44638 \text{ billions \$}$$
$$\omega_{2030}^{ARTIFICIAL\_INTELLIGENCE\_HEALTHCARE} = 1426 + 542 \cdot 14 + 214 \cdot 14^2 = 50958 \text{ billions \$}$$

4. The „accelerator of particles" which is 3D Printing, in the Worldwide Healthcare, concerning the hardwares, materials and softwares

Table 9 Wealth of statistical informations concerning 3D PRINTING in the WORLDWIDE HEALTHCARE for the HARDWARE

YEARS	3D PRINTING IN HEALTHCARE AT THE WORLDWIDE LEVEL HARDWARES (millions USD), $(\wp_i)$
2015	230,6
2016	256,5
2017	282,3
2018	312,5

Source: „Statista Portal United States of America"

- if the „style" of the modeling for $\wp$ variable, where $\wp$ = **3D Printing in Healthcare concerning Hardwares** at worldwide level, highlights a linear leaning $\wp_{t_i} = a + b \cdot t_i$, *a* and *b* will be [2]:

Table 10 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the HARDWARES, if this phenomenon highlights a linear leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE HARDWARES (millions \$) $(\wp_i)$	LINEAR TENDENCY			
		t_i^2	$t_i\wp_i$	$\wp_{t_i} = a + bt_i$	$\left\|\wp_i - \wp_{t_i}\right\|$
2015	230,6	4	-461,2	232,555	1,96
2016	256,5	1	-256,5	251,515	4,98
2017	282,3	1	+282,3	289,435	7,14
2018	312,5	4	+625	308,395	4,1
TOTAL	1081,9	10	189,6	1081,9	18,18

$$a=\frac{\begin{vmatrix}\sum_{i=1}^{n}\wp_i & \sum_{i=1}^{n}t_i\\ \sum_{i=1}^{n}\wp_i t_i & \sum_{i=1}^{n}t_i^2\end{vmatrix}}{\begin{vmatrix}n & \sum_{i=1}^{n}t_i\\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}t_i^2\end{vmatrix}}=\frac{\sum_{i=1}^{n}\wp_i\sum_{i=1}^{n}t_i^2-\sum_{i=1}^{n}\wp_i t_i\sum_{i=1}^{n}t_i}{n\sum_{i=1}^{n}t_i^2-\left(\sum_{i=1}^{n}t_i\right)^2}=\frac{1081{,}9\cdot 10-189{,}6\cdot 0}{4\cdot 10-0^2}=270{,}475$$

$$b=\frac{\begin{vmatrix}n & \sum_{i=1}^{n}\wp_i\\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}\wp_i t_i\end{vmatrix}}{\begin{vmatrix}n & \sum_{i=1}^{n}t_i\\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}t_i^2\end{vmatrix}}=\frac{n\sum_{i=1}^{n}\wp_i t_i-\sum_{i=1}^{n}t_i\sum_{i=1}^{n}\wp_i}{n\sum_{i=1}^{n}t_i^2-\left(\sum_{i=1}^{n}t_i\right)^2}=\frac{4\cdot 189{,}6-1081{,}9\cdot 0}{4\cdot 10-0^2}=18{,}96$$

$$v_I=\left[\frac{\sum_{i=1}^{n}\left|\wp_i-\wp_{t_i}^{I}\right|}{n}:\frac{\sum_{i=1}^{n}\wp_i}{n}\right]\cdot 100=\frac{\sum_{i=1}^{n}\left|\wp_i-\wp_{t_i}^{I}\right|}{\sum_{i=1}^{n}\wp_i}\cdot 100=\frac{18{,}18}{1081{,}9}\cdot 100=1{,}68\%$$

- if the „style" of the modeling for $\wp$ variable, where $\wp$ = **3D Printing in Healthcare concerning Hardwares**, highlights a quadratic leaning $\wp_{t_i}=a+b\cdot t_i+ct_i^2$, *a* and *b* will be [2]:

Table 11 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the HARDWARES, if this phenomenon highlights a quadratic leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE HARDWARES (millions $), $(\wp_i)$	PARABOLIC TENDENCY				
		t_i^2	t_i^4	$t_i^2\wp_i$	$\wp_{t_i}=a+b\wp_i+c\wp$	$\left\|\wp_i-\wp_{t_i}\right\|$
2015	**230,6**	4	16	922,4	233,63	3,03
2016	**256,5**	1	1	256,5	250,44	6,06
2017	**282,3**	1	1	282,3	288,36	0
2018	**312,5**	4	16	1250	309,47	3,03
TOTAL	**1081,9**	10	34	2711,2	1081,9	12,12

$$a=\frac{\sum_{i=1}^{n}t_i^4\sum_{i=1}^{n}\wp_i-\sum_{i=1}^{n}t_i^2\sum_{i=1}^{n}t_i^2\cdot\wp_i}{n\sum_{i=1}^{n}t_i^4-\left(\sum_{i=1}^{n}t_i^2\right)^2}=\frac{1081{,}9\cdot 34-10\cdot 2711{,}2}{4\cdot 34-10^2}=268{,}6833333$$

$$b=\frac{\sum_{i=1}^{n}\wp_i t_i}{\sum_{i=1}^{n}t_i^2}=\frac{189{,}6}{10}=18{,}96$$

$$c=\frac{n\cdot\sum_{i=1}^{n}t_i^2\cdot\wp_i-\sum_{i=1}^{n}t_i^2\cdot\sum_{i=1}^{n}\wp_i}{n\sum_{i=1}^{n}t_i^4-\left(\sum_{i=1}^{n}t_i^2\right)^2}=\frac{4\cdot 2711{,}2-10\cdot 1081{,}9}{4\cdot 34-10^2}=0{,}716666666$$

$$v_{II}=\left[\frac{\sum_{i=1}^{n}\left|\wp_i-\wp_{t_i}^{I}\right|}{n}:\frac{\sum_{i=1}^{n}\xi_i}{n}\right]\cdot 100=\frac{\sum_{i=1}^{n}\left|\wp_i-\wp_{t_i}^{I}\right|}{\sum_{i=1}^{n}\wp_i}\cdot 100=\frac{12{,}12}{1081{,}9}\cdot 100=1{,}12\%$$

- if the „style" of the modeling for $\wp$ variable, where $\wp$ = **3D Printing in Healthcare concerning Hardwares**, highlights an exponential leaning $\wp_{t_i} = ab^{t_i}$, *a* and *b* will be [2]:

Table 12 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the HARDWARES, if this phenomenon highlights an exponential leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE HARDWARES (millions $) $(\wp_i)$	EXPONENTIAL TENDENCY				
		$\lg\wp_i$	$t_i \lg\wp_i$	$\lg\wp_{t_i} = \lg a + t_i \lg b$	$\wp_{t_i} = ab^{t_i}$	$\lvert\wp_i - \wp_{t_i}\rvert$
2015	**230,6**	2,362859303	-4,725718606	2,368255905	233,4833441	2,88
2016	**256,5**	2,409087369	-2,409087369	2,398816399	250,5050002	5,99
2017	**282,3**	2,450710878	+2,450710878	2,459937387	288,3615737	6,06
2018	**312,5**	2,494850022	+4,989700043	2,490497881	309,384022	3,12
TOTAL	**1081,9**	9,717507572	0,305604946			18,05

$$\lg a = \frac{\begin{vmatrix} \sum_{i=1}^{n} \lg\wp_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i \lg\wp_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n} \lg\wp_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n} t_i \lg\wp_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{9,717507572 \cdot 10 - 1,384279145 \cdot 0}{4 \cdot 10 - 0^2} = 2,429376893$$

$$\lg b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n} \lg\wp_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i \lg\wp_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n \cdot \sum_{i=1}^{n} t_i \lg\wp_i - \sum_{i=1}^{n} \lg\wp_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{4 \cdot 0,305604946 - 10,25684467 \cdot 0}{4 \cdot 10 - 0^2} = 0,0305604946$$

$$v_{\exp onential} = \left[\frac{\sum_{i=1}^{n} \left|\wp_i - \wp_{t_i}^{I}\right|}{n} : \frac{\sum_{i=1}^{n} \wp_i}{n} \right] \cdot 100 = \frac{\sum_{i=1}^{n} \left|\wp_i - \wp_{t_i}^{I}\right|}{\sum_{i=1}^{n} \xi_i} \cdot 100 = \frac{18,05}{1081,9} \cdot 100 = 1,67\%$$

$$v_{II} = 1,12\% < v_{\exp onential} = 1,67\% < v_I = 1,68\%$$

The „style" of the modeling for $\wp$ factor, which represents the Hardwares from the Medical 3D Printing, follows a parabolic trend $\wp_{t_i} = a + b \cdot t_i + ct_i^2$

Table 13 Wealth of statistical informations regarding 3D PRINTING in the WORLDWIDE HEALTHCARE for the MATERIALS

YEARS	3D PRINTING IN HEALTHCARE AT THE WORLDWIDE LEVEL MATERIALS (millions USD) (η_i)
2015	**81,9**
2016	**125**
2017	**172,4**
2018	**224,1**

Source: „Statista Portal United States of America"

- if the „style" of the modeling for η variable, where η = **3D Printing in Healthcare concerning Materials** at worldwide level**,** highlights a linear leaning $\eta_{t_i} = a + b \cdot t_i$, *a* and *b* will be [2]:

Table 14 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the MATERIALS, if this phenomenon highlights a linear leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE MATERIALS (millions $) (η_i)	LINEAR TENDENCY			
		t_i^2	$t_i\eta_i$	$\eta_{t_i} = a + bt_i$	$\lvert\eta_i - \eta_{t_i}\rvert$
2015	**81,9**	4	-163,8	84,49	2,59
2016	**125**	1	-125	117,67	7,33
2017	**172,4**	1	+172,4	184,03	11,63
2018	**224,1**	4	+448,2	217,21	6,89
TOTAL	**603,4**	10	331,8	603,4	28,44

$$a = \frac{\begin{vmatrix} \sum_{i=1}^{n}\eta_i & \sum_{i=1}^{n}t_i \\ \sum_{i=1}^{n}\eta_i t_i & \sum_{i=1}^{n}t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n}t_i \\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n}\eta_i\sum_{i=1}^{n}t_i^2 - \sum_{i=1}^{n}\eta_i t_i\sum_{i=1}^{n}t_i}{n\sum_{i=1}^{n}t_i^2 - \left(\sum_{i=1}^{n}t_i\right)^2} = \frac{603{,}4\cdot 10 - 331{,}8\cdot 0}{4\cdot 10 - 0^2} = 150{,}85$$

$$b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n}\eta_i \\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}\eta_i t_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n}t_i \\ \sum_{i=1}^{n}t_i & \sum_{i=1}^{n}t_i^2 \end{vmatrix}} = \frac{n\sum_{i=1}^{n}\eta_i t_i - \sum_{i=1}^{n}t_i\sum_{i=1}^{n}\eta_i}{n\sum_{i=1}^{n}t_i^2 - \left(\sum_{i=1}^{n}t_i\right)^2} = \frac{4\cdot 331{,}8 - 603{,}4\cdot 0}{4\cdot 10 - 0^2} = 33{,}18$$

$$v_I = \left[\frac{\sum_{i=1}^{n}\left|\eta_i - \eta_{t_i}^I\right|}{n} : \frac{\sum_{i=1}^{n}\eta_i}{n}\right]\cdot 100 = \frac{\sum_{i=1}^{n}\left|\eta_i - \eta_{t_i}^I\right|}{\sum_{i=1}^{n}\eta_i}\cdot 100 = \frac{28{,}44}{603{,}4}\cdot 100 = 4{,}713291349\%$$

- if the „style" of the modeling for η variable, where η = **3D Printing in Healthcare concerning Materials***,* highlights a quadratic leaning $\eta_{t_i} = a + b \cdot t_i + ct_i^2$, *a* and *b* will be [2]:

Table 15 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the MATERIALS, if this phenomenon highlights a quadratic leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE MATERIALS (millions $) (η_i)	PARABOLIC TENDENCY				
		t_i^2	t_i^4	$t_i^2\eta_i$	$\eta_{t_i} = a + b\eta_i + c\eta_i^2$	$\lvert\eta_i - \eta_{t_i}\rvert$
2015	**81,9**	4	16	327,6	86,000006	4,74000006
2016	**125**	1	1	125	115,52	9,48
2017	**172,4**	1	1	172,4	181,88	9,48
2018	**224,1**	4	16	896,4	219,36	4,74
TOTAL	**603,4**	10	34	1521,4	603,4	28,44000006

$$a = \frac{\sum_{i=1}^{n} t_i^4 \sum_{i=1}^{n} \eta_i - \sum_{i=1}^{n} t_i^2 \sum_{i=1}^{n} t_i^2 \cdot \eta_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2} = \frac{34 \cdot 603{,}4 - 10 \cdot 1521{,}4}{4 \cdot 34 - 10^2} = 147{,}26666677$$

$$b = \frac{\sum_{i=1}^{n} \eta_i t_i}{\sum_{i=1}^{n} t_i^2} = \frac{331{,}8}{10} = 33{,}18$$

$$c = \frac{n \cdot \sum_{i=1}^{n} t_i^2 \cdot \eta_i - \sum_{i=1}^{n} t_i^2 \cdot \sum_{i=1}^{n} \eta_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2} = \frac{4 \cdot 1521{,}4 - 10 \cdot 603{,}4}{4 \cdot 34 - 10^2} = 1{,}4333333333$$

$$v_{II} = \left[\frac{\sum_{i=1}^{n} \left|\eta_i - \eta_{t_i}^I\right|}{n} : \frac{\sum_{i=1}^{n} \xi_i}{n}\right] \cdot 100 = \frac{\sum_{i=1}^{n} \left|\eta_i - \eta_{t_i}^I\right|}{\sum_{i=1}^{n} \eta_i} \cdot 100 = \frac{28{,}44000006}{603{,}4} \cdot 100 = 4{,}713291354\%$$

- if the „style" of the modeling for η variable, where η = **3D Printing in Healthcare concerning Materials***,* highlights an exponential leaning $\eta_{t_i} = ab^{t_i}$ *, a* and *b* will be [2]:

Table 16 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the MATERIALS, if this phenomenon highlights an exponential leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE MATERIALS (millions $) (η_i)	EXPONENTIAL TENDENCY				
		$\lg\eta_i$	$t_i \lg\eta_i$	$\lg\eta_{t_i} = \lg a + t_i \lg b$	$\eta_{t_i} = ab^{t_i}$	$\left\|\eta_i - \eta_{t_i}\right\|$
2015	**81,9**	1,913283902	-3,826567804	1,946504628	88,41065905	6,51
2016	**125**	2,096910013	-2,096910013	2,047898943	111,6603392	13,34
2017	**172,4**	2,236537261	+2,236537261	2,250687573	178,1097004	5,71
2018	**224,1**	2,350441857	+4,700883713	2,352081888	224,9478712	0,85
TOTAL	**603,4**	8,597173033	1,013943157			26,41

$$\lg a = \frac{\begin{vmatrix} \sum_{i=1}^{n} \lg\eta_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i \lg\eta_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n} \lg\eta_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n} t_i \lg\eta_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{8{,}597173033 \cdot 10 - 1{,}013943157 \cdot 0}{4 \cdot 10 - 0^2} = 2{,}129293858$$

$$\lg b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n} \lg\eta_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i \lg\eta_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n \cdot \sum_{i=1}^{n} t_i \lg\eta_i - \sum_{i=1}^{n} \lg\eta_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{4 \cdot 1{,}013943157 - 8{,}597173033 \cdot 0}{4 \cdot 10 - 0^2} = 0{,}1013943157$$

$$v_{\exp onential} = \left[\frac{\sum_{i=1}^{n} \left|\eta_i - \eta_{t_i}^I\right|}{n} : \frac{\sum_{i=1}^{n} \eta_i}{n}\right] \cdot 100 = \frac{\sum_{i=1}^{n} \left|\eta_i - \eta_{t_i}^I\right|}{\sum_{i=1}^{n} \eta_i} \cdot 100 = \frac{26{,}41}{603{,}4} \cdot 100 = 4{,}376864235\%$$

$$v_{exponential} = 4{,}376864235\% < v_I = 4{,}713291349 < v_{II} = 4{,}713291354$$

The „style" of the modeling for η factor, which represents the materials from the Medical 3D Printing follows an exponential leaning $\eta_{t_i} = ab^{t_i}$

Table 17 Wealth of statistical informations concerning 3D PRINTING in the WORLDWIDE HEALTHCARE for SOFTWARE

YEARS	3D PRINTING IN HEALTHCARE AT THE WORLDWIDE LEVEL SOFTWARES (millions USD), $(\mu\infty_i)$
2015	12,9
2016	12,9
2017	17,2
2018	19,4

Source: „Statista Portal United States of America"

- if the „style" of the modeling for $\mu\infty$ variable, where $\mu\infty$ = **3D Printing in Healthcare concerning Softwares** at worldwide level**,** highlights a linear leaning $\mu\infty_{t_i} = a + b \cdot t_i$, *a* and *b* will be [2]:

Table 18 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the SOFTWARES, if this phenomenon highlights a linear leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE SOFTWARES (millions $), $(\mu\infty_i)$	LINEAR TENDENCY			
		t_i^2	$t_i\mu\infty_i$	$\mu\infty_{t_i} = a + bt_i$	$\lvert\mu\infty_i - \mu\infty_{t_i}\rvert$
2015	12,9	4	-25,8	12,14	0,76
2016	12,9	1	-12,9	13,87	0,97
2017	17,2	1	+17,2	17,33	0,13
2018	19,4	4	+38,8	19,06	0,34
TOTAL	62,4	10	17,3	62,4	2,2

$$a = \frac{\begin{vmatrix} \sum_{i=1}^{n}\mu\infty_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n}\mu\infty_i t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n}\mu\infty_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n}\mu\infty_i t_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{62{,}4 \cdot 10 - 17{,}3 \cdot 0}{4 \cdot 10 - 0^2} = 15{,}6$$

$$b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n}\mu\infty_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n}\mu\infty_i t_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n\sum_{i=1}^{n}\mu\infty_i t_i - \sum_{i=1}^{n} t_i \sum_{i=1}^{n}\mu\infty_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{4 \cdot 17{,}3 - 62{,}4 \cdot 0}{4 \cdot 10 - 0^2} = 1{,}73$$

$$v_I = \left[\frac{\sum_{i=1}^{n}\left|\mu\infty_i - \xi_{t_i}^I\right|}{n} : \frac{\sum_{i=1}^{n}\mu\infty_i}{n}\right] \cdot 100 = \frac{\sum_{i=1}^{n}\left|\mu\infty_i - \mu\infty_{t_i}^I\right|}{\sum_{i=1}^{n}\mu\infty_i} \cdot 100 = \frac{2{,}2}{62{,}4} \cdot 100 = 3{,}52\%$$

- if the „style" of the modeling for $\mu\infty$ variable, where $\mu\infty$ = **3D Printing in Healthcare concerning Softwares***,* highlights a quadratic leaning $\mu\infty_{t_i} = a + b \cdot t_i + ct_i^2$, *a* and *b* will be [2]:

Table 19 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the SOFTWARES, if this phenomenon highlights a quadratic leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE SOFTWARES (millions $), $(\mu\infty_i)$	PARABOLIC TENDENCY				
		t_i^2	t_i^4	$t_i^2\eta\infty_i$	$\mu\infty_{t_i} = a + b\mu\infty_i + c\mu\infty_i^2$	$\lvert\mu\infty_i - \mu\infty_{t_i}\rvert$
2015	**12,9**	4	16	51,6	12,68999999	0,2
2016	**12,9**	1	1	12,9	13,32	0,42
2017	**17,2**	1	1	17,2	16,78	0,42
2018	**19,4**	4	16	77,6	19,60999999	0,21
TOTAL	**62,4**	10	34	159,3	62,39999998	1,25

$$a = \frac{\sum_{i=1}^{n} t_i^4 \sum_{i=1}^{n} \mu\infty_i - \sum_{i=1}^{n} t_i^2 \sum_{i=1}^{n} t_i^2 \cdot \mu\infty_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2} = \frac{34 \cdot 62{,}4 - 10 \cdot 159{,}3}{4 \cdot 34 - 10^2} = 14{,}68333333$$

$$b = \frac{\sum_{i=1}^{n} \mu\infty_i t_i}{\sum_{i=1}^{n} t_i^2} = \frac{17{,}3}{10} = 1{,}73$$

$$c = \frac{n \cdot \sum_{i=1}^{n} t_i^2 \cdot \mu\infty_i - \sum_{i=1}^{n} t_i^2 \cdot \sum_{i=1}^{n} \mu\infty_i}{n\sum_{i=1}^{n} t_i^4 - \left(\sum_{i=1}^{n} t_i^2\right)^2} = \frac{4 \cdot 159{,}3 - 10 \cdot 62{,}4}{4 \cdot 34 - 10^2} = 0{,}366666666$$

$$v_{II} = \left[\frac{\sum_{i=1}^{n} \left|\mu\infty_i - \mu\infty_{t_i}^{I}\right|}{n} : \frac{\sum_{i=1}^{n} \mu\infty_i}{n}\right] \cdot 100 = \frac{\sum_{i=1}^{n} \left|\mu\infty_i - \mu\infty_{t_i}^{I}\right|}{\sum_{i=1}^{n} \mu\infty_i} \cdot 100 = \frac{1{,}25}{62{,}4} \cdot 100 = 2\%$$

- if the „style" of the modeling for $\mu\infty$ variable, where $\mu\infty$ = **3D Printing in Healthcare concerning Softwares**, highlights an exponential leaning $\mu\infty_{t_i} = ab^{t_i}$, *a* and *b* will be [2]:

Table 20 The „smart" display concerning the projection of the values for 3D PRINTING in the WORLDWIDE HEALTHCARE regarding the SOFTWARES, if this phenomenon highlights an exponential leaning

YEARS	3D PRINTING IN THE WORLDWIDE HEALTHCARE SOFTWARES (millions $) $(\mu\infty_i)$	EXPONENTIAL TENDENCY				
		$\lg\mu\infty_i$	$t_i \lg\mu\infty_i$	$\lg\mu\infty_{t_i} = \lg a + t_i \lg b$	$\mu\infty_{t_i} = ab^{t_i}$	$\lvert\mu\infty_i - \mu\infty_{t_i}\rvert$
2015	**12,9**	1,11058971	-2,221179421	1,090254845	12,30990907	0,59
2016	**12,9**	1,11058971	-1,11058971	1,138191122	13,74646789	0,8
2017	**17,2**	1,235528447	+1,235528447	1,234063676	17,14208625	0,1
2018	**19,4**	1,28780173	+2,57560346	1,28199953	19,14255718	0,3
TOTAL	**62,4**	4,744509597	0,479362776			1,79

$$\lg a = \frac{\begin{vmatrix} \sum_{i=1}^{n} \lg \mu\infty_i & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i \lg \mu\infty_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{\sum_{i=1}^{n} \lg \mu\infty_i \sum_{i=1}^{n} t_i^2 - \sum_{i=1}^{n} t_i \lg \mu\infty_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{4{,}744509597 \cdot 10 - 0{,}479362776 \cdot 0}{4 \cdot 10 - 0^2} = 1{,}186127399$$

$$\lg b = \frac{\begin{vmatrix} n & \sum_{i=1}^{n} \lg \mu\infty_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i \lg \mu\infty_i \end{vmatrix}}{\begin{vmatrix} n & \sum_{i=1}^{n} t_i \\ \sum_{i=1}^{n} t_i & \sum_{i=1}^{n} t_i^2 \end{vmatrix}} = \frac{n \cdot \sum_{i=1}^{n} t_i \lg \mu\infty_i - \sum_{i=1}^{n} \lg \mu\infty_i \sum_{i=1}^{n} t_i}{n\sum_{i=1}^{n} t_i^2 - \left(\sum_{i=1}^{n} t_i\right)^2} = \frac{4 \cdot 0{,}479362776 - 4{,}744509597 \cdot 0}{4 \cdot 10 - 0^2} = 0{,}0479362776$$

$$v_{\exp onential} = \left[\frac{\sum_{i=1}^{n} \left| \mu\infty_i - \mu\infty_{t_i}^{I} \right|}{n} : \frac{\sum_{i=1}^{n} \mu\infty_i}{n} \right] \cdot 100 = \frac{\sum_{i=1}^{n} \left| \mu\infty_i - \mu\infty_{t_i}^{I} \right|}{\sum_{i=1}^{n} \mu\infty_i} \cdot 100 = \frac{1{,}79}{62{,}4} \cdot 100 = 2{,}86\%$$

$$v_{II} = 2\% < v_{\exp onential} = 2{,}86\% < v_I = 3{,}52\%$$

The „style" of the modeling for $\mu\infty$ factor, which represents the Softwares from the Medical 3D Printing, follows a parabolic trend $\mu\infty_{t_i} = a + b \cdot t_i + ct_i^2$

5. Conclusions

3D Printing in the worldwide healthcare represents a revolutionary land of the innovations in medicine, with a huge potential which supposes gorgeous possibilities for to improve the health of the people. The wealth of the statistical informations, which displays the development concerning 3D Printing in the worldwide healthcare, projects a parabolical model. The „arsenal" of the statistical values, which expresses the evolution regarding the artificial intelligence in the worldwide healthcare, configures a quadratic trend. The wealth of the statistical data, which demonstrates the number of the hardwares applied in the construction of 3D Printing in healthcare at the worldwide level, models a parabolical trajectory. The series of the statistical data, which reflects the materials used in the worldwide healthcare for to achieve 3D Printing, focuses an exponential model. The wealth of the statistical informations, which demonstrates the „encyclopedia of softwares" used for to model 3D Printing in the worldwide healthcare, shows a parabolical trajectory. The forecasts between 2019-2030 concerning the values of 3D Printing, respectivelly the artificial intelligence, in the worldwide medical field, highlight an increasing tendency.

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