

# The geography of Olympic combat sports – part one: judo, karate, taekwondo

## Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Manuscript Preparation
- E Funds Collection

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## Abstract

### Background and Study Aim:

The gradual introduction of combat sports into the modern Olympic disciplines was dictated by their popularity, global prestige and meeting International Olympic Committee (IOC) guidelines. The perspective of spatial differentiation and development of Olympic combat sports is the premise of this paper. The aim of the paper is an in-depth reflection on the phenomenon of the geography of the Olympic combat sports from the Far East – judo, karate and taekwondo.

### Material and Methods:

Judo, karate and taekwondo results from the Olympic Games posted on the IOC website were analysed. For this purpose, the method of secondary source analysis was used. Two new indicators were then constructed to relativize the data: the Olympic Games medal winning frequency index (M); the Olympic Games points winning frequency index (P). A cartographic method – choropleth map and proportional symbol map – was used to illustrate the results. The natural interval method was used to determine class intervals.

### Results:

Regarding the number of medals won, Japan dominates in judo, Turkey in karate and South Korea in taekwondo. However, regarding the weight of medals won, Japan dominates in both judo and karate, and South Korea in taekwondo. Unfortunately, Japan is not a member of CISM (Conseil International du Sport Militaire), and karate is not competitive at the highest level in this organization of athlete-soldiers.

### Conclusions:

The obtained results show the impact of geography on sport. The countries where judo, karate and taekwondo originated dominate the Olympic competition in these disciplines of Far Eastern combat sports.

### Keywords:

choropleth map • CISM • division of the combat sports • geography of sport • Olympic Games • proportional symbol map

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**Judo** – a combat sport created in Japan by Jigorō Kanō from the martial art of jūjutsu. The standards of judo marked the development of other Japanese combat sports. Olympic competition takes place according to the rules of the International Judo Federation [49].

**Judo** – *noun* a Japanese martial art in which opponents use balance and body weight, with minimal physical effort, to throw each other or hold each other in a lock [52].

**Karate** – a martial art developed by the people of Okinawa (now in Japan) as a method of self-defence without the use of weapons. Gichin Funakoshi is considered to be the founder of modern karate. Karate was adapted for sporting competition in the mid-20th century by the Japan Karate Association. Olympic competition follows the rules of the World Karate Federation [50].

**Karate** – *noun* a traditional Japanese form of unarmed combat, now widely popular as a sport, in which fast blows and kicks are used [52].

**Taekwondo** – a martial art developed in Korea by General Choi Hong-hi. In the second half of the 20th century, taekwondo was adapted for sports competition by the International Taekwondo Federation. Olympic competition is held according to the rules of the World Taekwondo Federation [51].

**Taekwondo** – *noun* a Korean martial art that resembles karate but also employs a wide range of acrobatic kicking moves [52].

**CISM (Conseil International du Sport Militaire)** – was founded on the 18th of February 1948 in Nice (France) by founding countries: Belgium, Denmark, France, Luxembourg and the Netherlands. In 1950 the nine European countries were joined by Argentina and Egypt, then the USA in 1951 joined and in 1952 Iraq, the Lebanon, Pakistan and Syria. Although the number of member countries rose quickly – in 1978 CISM had 72 member countries – the organization was not accredited by the International Olympic Committee. CISM did not have the universal status, in fact. The countries of the former Warsaw Pact were not CISM members, they

## INTRODUCTION

The geography of sport is a resultant of geography (from the earth and environmental sciences) [1] and sport (from the physical culture sciences) [2] and can be located in the discipline of physical culture sciences [3]. Sport geography is a science that studies the distribution of elements within sport and the impact of geography on sport [4-8]. It is an area not fully explored yet [9]. The analysis of the existing literature indicates [10] that to date, the geography of combat sports has not been described [11]. Therefore, the geography of combat sports has been defined as the science that studies the distribution of elements within combat sports and the impact of geography on combat sports.

It is known from the history of physical culture that the ancient Olympic Games were held in Greece every four years from 776 BC to 393 AD [12]. An “Ekecheiria” was declared for the duration of the Olympic Games, resulting in the temporary cessation of wars. This is the law of Olympic truce – a viable counter-response to the moral evil of war [13]. In those days, a combat sport called pankration, which combined boxing and wrestling techniques, was played at the Games. Pierre de Coubertin returned to the idea of Olympism in the 19th century. On his initiative, the International Olympic Committee (IOC) was established in 1894 and the first modern Olympic Games were held in Athens in 1896. During these “Games of the First Olympiad”, nine sports were played [14]. Since then, the Olympic programme has been modernised several times. Some sports have been discontinued and others have been introduced. At this point, it should be noted that the Olympic programme covers all sports of the Olympic Games. The IOC has the right to add or remove a sport. Moreover, any sport can be included in the Olympic programme. The condition is that the sport in question must be governed by an international sports federation that adheres to the Olympic Charter and applies the World Anti-Doping Code [15].

Modern Olympic combat sports include boxing [16], fencing [17], judo [18], karate [19], partly modern pentathlon [20], taekwondo [21] and wrestling [22]. Competition in fencing and wrestling has been present since the first modern Olympic Games in Athens in 1896. At the 1904 Olympic Games in Saint Louis, boxing was included in the programme. Since the 1912 Olympic Games in Stockholm, the modern

pentathlon (fencing with sabre, swimming in free-style, second round of fencing with sabre, equestrianism, cross-country running with shooting) has been played. In 1964, at the Olympic Games in Tokyo, judo was introduced to the program. In turn, taekwondo debuted at the Olympic Games in Sydney in 2000 [23]. The youngest Olympic combat sport is karate, which entered the Tokyo Olympic Games programme in 2020 [24]. The gradual introduction of the above-mentioned combat sports into the Olympic disciplines was not accidental. It was dictated by the popularity of the combat sports in question, their widespread practice worldwide and the fulfilment of a number of criteria established by the IOC [25]. The perspective of spatial differentiation and development of Olympic combat sports is the premise of this study.

The aim of the paper is an in-depth reflection on the phenomenon of the geography of the Olympic combat sports from the Far East – judo, karate and taekwondo.

## MATERIAL AND METHODS

In the first step, the method of secondary source analysis was used. Judo, karate and taekwondo results from the Olympic Games, as posted on the IOC website [26], were used for the analyses. The spatial scope of the subject of the study covered the area of all countries of the world. The time span of the study was 1964-2021, as judo, karate and taekwondo were played at the Olympic Games during these years. The Tokyo 2020 Olympic Games were actually played one year later due to the COVID-19 pandemic [27-29]. Therefore, the time range for judo was 1964-2021 (except 1968, when it was not included in the Olympic programme), for karate 2021 and for taekwondo 2000-2021. The total number of medals won by a given country and the weight of these medals were analysed according to a weighted point system: gold - 5 points; silver - 3 points; bronze - 1 point. The medal classifications of the studied countries were related to the contemporary geopolitical division of the world, therefore some adjustments had to be made. The medals for Czechoslovakia, Yugoslavia, the USSR and the CIS were divided into individual countries taking into account the nationality of the medal-winning athlete. In contrast, medals for East Germany and West Germany were added up as medals for Germany.

In a second step, the following indicators were constructed:

- the Olympic Games medal winning frequency index (M) = (number of gold medals + number of silver medals + number of bronze medals) / number of Olympic Games at which the given competition was held;
- the Olympic Games points winning frequency index (P) = (number of gold medals x 5 points + number of silver medals x 3 points + number of bronze medals x 1 point) / number of Olympic Games at which the given competition was held.

In the third step, cartographic methods - proportional symbol map and choropleth map - were used to illustrate the spatial distribution of the studied characteristics. Proportional symbol map was used to illustrate the total number as well as the individual colours of the medals, and choropleth map was used for the points winning frequency index at the Olympic Games; the maps were generated in QGIS 3.28 GIS software. A proportional symbol map is a quantitative method that is used to show the spatial distribution of specific values of a phenomenon by means of diagrams varying in size, while a choropleth map shows the intensity of that phenomenon in specific reference fields, in this case countries. The proportional symbol map is a quantitative method for showing absolute data, while the choropleth map is a method displaying relative data [30, 31].

For the points winning frequency index (P), five classes were determined for all disciplines, taking into account that the discipline of karate has the smallest number of observations. The authors used the natural interval method (Jenks' method, the optimisation method) to determine the class intervals when creating the choropleth maps. This is a frequently used method that involves clustering similar values together so that class boundaries are shared by dissimilar values. In QGIS, the determination of classes in this method is based on appropriate algorithms that analyse the value graph and indicate the "natural gaps" in which the class boundaries will be found. Optimisation in this method is based on finding the largest possible gaps and groups of values as close to each other as possible [30, 31]. The "Cultural" cartographic base map at a scale of 1:10 000 000 available in the public domain was used to generate the maps [32].

## RESULTS

### Judo

In the history of judo competition at the Olympic Games, representatives from as many as 51 countries have won medals (Table 1), reflecting the popularity of the sport in many regions of the world (mainly Asia, Europe, North and South America) – Figure 1. Japan dominates the medal standings, ahead of second-placed France by almost 40 medals and third-placed South Korea by 50 medals (the ranking of these countries regarding the points classification is identical – Table 2). The most frequent medal scorers besides these three countries were: Cuba, Germany, Russia, Georgia, China, Brazil and the Netherlands. Poland is 17th in terms of number of medals won and 14th in terms of total points won.

### Karate

Due to the fact that karate made its debut at the 2020 (2021) OG, both the number of medals (Table 3) and the sum of points (Table 4) obtained by individual countries is small, nevertheless, the countries that stand out can be identified: Turkey (first in terms of the number of medals won) and Japan (first in terms of total points). Interestingly enough, only representatives of countries from the northern hemisphere (Figure 2), and a rather narrow belt of countries from Asia, Europe and North America (temperate latitudes), won medals.

### Taekwondo

South Korea dominates the medal competition, well ahead of China and the USA (Table 5). South Korea's hegemony is also confirmed by the medal point totals and the designated indicators (Table 6). Taekwondo is a combat sport practiced and popular in many countries (Figure 3), but there is a visible large "white spot" in Europe - a lack of medals won by a group of post-socialist and Baltic countries (Sweden, Finland, Poland, the Czech Republic, Slovakia, Lithuania, Latvia, Estonia, Belarus, Ukraine, Hungary).

## DISCUSSION

The geography of Olympic combat sports from the Far East presents the dominance of specific countries in judo, karate and taekwondo throughout the history of the modern Olympic Games as well as the spatial distribution of the countries in which these disciplines are popular enough to result in Olympic medals. This is

established their own sports organization – known as SKDA. A chance to change this state of affairs appeared in the late 80's, when the geopolitical situation in the world started to undergo the radical change. The end of the Cold War, disbanding the Warsaw Pact, establishing cooperation – also on military ground – between countries that used to be in hostile political camps, caused rapprochement of CISM and SKDA. The representatives of CISM and SKDA have entered into discussions to merge this two largest military sports organizations. On the 10th of April 1991 in Moscow (Russia) the agreement was signed under which the countries of SKDA were joining the CISM [43].

**SKDA (Sportivnyj Komitet Družestviennyh Armii)** – Sports Committee of the Friendship Armies [43].

**Division of the combat sports under forms of the direct confrontation** – workings of weapons; hits (strokes); throws and grips of immobilisation of opponent's body [11].

**Main relationship between combat sport and martial arts** – "every combat sport is martial arts but not vice versa" [11, p. 18]

**Table 1.** Medals won by individual countries in judo

| No. | Country                     | gold | silver | bronze | Total number of medals | M index |
|-----|-----------------------------|------|--------|--------|------------------------|---------|
| 1   | Japan                       | 48   | 21     | 27     | 96                     | 6.86    |
| 2   | France                      | 16   | 13     | 28     | 57                     | 4.07    |
| 3   | South Korea                 | 11   | 17     | 18     | 46                     | 3.29    |
| 4   | Germany <sup>A</sup>        | 5    | 10     | 25     | 40                     | 2.86    |
| 5   | Cuba                        | 6    | 15     | 16     | 37                     | 2.64    |
| 6   | Russia <sup>B</sup>         | 8    | 7      | 18     | 33                     | 2.36    |
| 7   | Brazil                      | 4    | 3      | 17     | 24                     | 1.71    |
| 8   | Netherlands                 | 4    | 2      | 18     | 24                     | 1.71    |
| 9   | Georgia <sup>C</sup>        | 7    | 7      | 9      | 23                     | 1.64    |
| 10  | China                       | 8    | 3      | 11     | 22                     | 1.57    |
| 11  | United Kingdom              | 0    | 8      | 12     | 20                     | 1.43    |
| 12  | Italy                       | 4    | 4      | 9      | 17                     | 1.21    |
| 13  | USA                         | 2    | 4      | 8      | 14                     | 1.00    |
| 14  | Belgium                     | 2    | 1      | 10     | 13                     | 0.93    |
| 15  | Mongolia                    | 1    | 4      | 6      | 11                     | 0.79    |
| 16  | Hungary                     | 1    | 3      | 6      | 10                     | 0.71    |
| 17  | Poland                      | 3    | 3      | 2      | 8                      | 0.57    |
| 18  | North Korea                 | 2    | 2      | 4      | 8                      | 0.57    |
| 19  | Austria                     | 2    | 3      | 2      | 7                      | 0.50    |
| 20  | Uzbekistan                  | 0    | 2      | 5      | 7                      | 0.50    |
| 21  | Canada                      | 0    | 2      | 5      | 7                      | 0.50    |
| 22  | Spain                       | 3    | 1      | 2      | 6                      | 0.43    |
| 23  | Azerbaijan                  | 2    | 2      | 2      | 6                      | 0.43    |
| 24  | Slovenia                    | 2    | 1      | 3      | 6                      | 0.43    |
| 25  | Romania                     | 1    | 2      | 3      | 6                      | 0.43    |
| 26  | Israel                      | 0    | 1      | 5      | 6                      | 0.43    |
| 27  | Switzerland                 | 1    | 1      | 2      | 4                      | 0.29    |
| 28  | Kazakhstan                  | 0    | 2      | 2      | 4                      | 0.29    |
| 29  | Ukraine                     | 0    | 1      | 3      | 4                      | 0.29    |
| 30  | Kosovo                      | 3    | 0      | 0      | 3                      | 0.21    |
| 31  | Czech Republic <sup>E</sup> | 2    | 0      | 1      | 3                      | 0.21    |
| 32  | Bulgaria                    | 0    | 1      | 2      | 3                      | 0.21    |
| 33  | Estonia                     | 0    | 0      | 3      | 3                      | 0.21    |
| 34  | Portugal                    | 0    | 0      | 3      | 3                      | 0.21    |
| 35  | Argentina                   | 1    | 0      | 1      | 2                      | 0.14    |
| 36  | Belarus                     | 1    | 0      | 1      | 2                      | 0.14    |
| 37  | Turkey                      | 1    | 0      | 1      | 2                      | 0.14    |
| 38  | Greece                      | 1    | 0      | 1      | 2                      | 0.14    |
| 39  | Algeria                     | 0    | 1      | 1      | 2                      | 0.14    |
| 40  | Columbia                    | 0    | 1      | 1      | 2                      | 0.14    |

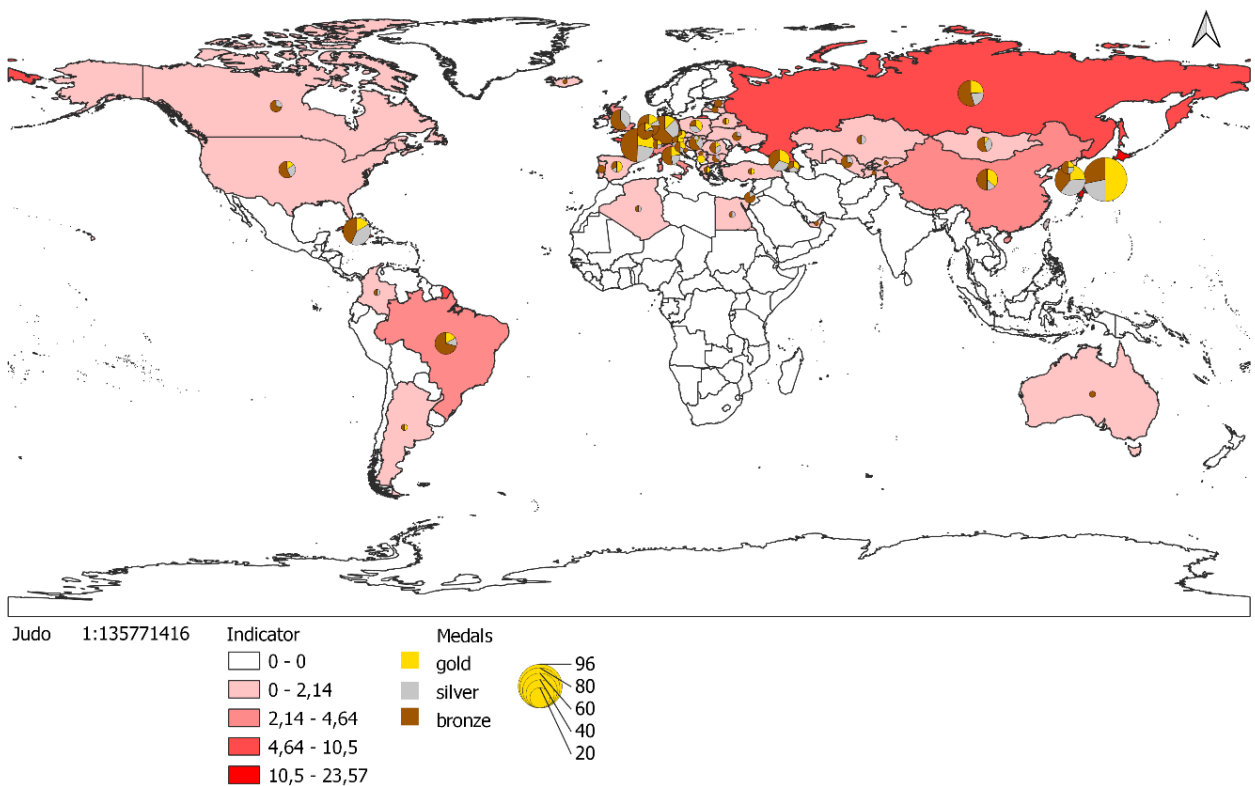
**Table 2.** Points won by individual countries in judo

| No. | Country                     | Total number of points | P index |
|-----|-----------------------------|------------------------|---------|
| 1   | Japan                       | 330                    | 23.57   |
| 2   | France                      | 147                    | 10.50   |
| 3   | South Korea                 | 124                    | 8.86    |
| 4   | Cuba                        | 91                     | 6.50    |
| 5   | Germany <sup>A</sup>        | 80                     | 5.71    |
| 6   | Russia <sup>B</sup>         | 79                     | 5.64    |
| 7   | Georgia <sup>C</sup>        | 65                     | 4.64    |
| 8   | China                       | 60                     | 4.29    |
| 9   | Brazil                      | 46                     | 3.29    |
| 10  | Netherlands                 | 44                     | 3.14    |
| 11  | Italy                       | 41                     | 2.93    |
| 12  | United Kingdom              | 36                     | 2.57    |
| 13  | USA                         | 30                     | 2.14    |
| 14  | Poland                      | 26                     | 1.86    |
| 15  | Belgium                     | 23                     | 1.64    |
| 16  | Mongolia                    | 23                     | 1.64    |
| 17  | Austria                     | 21                     | 1.50    |
| 18  | Hungary                     | 20                     | 1.43    |
| 19  | North Korea                 | 20                     | 1.43    |
| 20  | Spain                       | 20                     | 1.43    |
| 21  | Azerbaijan <sup>D</sup>     | 18                     | 1.29    |
| 22  | Slovenia                    | 16                     | 1.14    |
| 23  | Kosovo                      | 15                     | 1.07    |
| 24  | Romania                     | 14                     | 1.00    |
| 25  | Uzbekistan                  | 11                     | 0.79    |
| 26  | Canada                      | 11                     | 0.79    |
| 27  | Czech Republic <sup>E</sup> | 11                     | 0.79    |
| 28  | Switzerland                 | 10                     | 0.71    |
| 29  | Israel                      | 8                      | 0.57    |
| 30  | Kazakhstan                  | 8                      | 0.57    |
| 31  | Ukraine                     | 6                      | 0.43    |
| 32  | Argentina                   | 6                      | 0.43    |
| 33  | Belarus                     | 6                      | 0.43    |
| 34  | Tukey                       | 6                      | 0.43    |
| 35  | Greece                      | 6                      | 0.43    |
| 36  | Bulgaria                    | 5                      | 0.36    |
| 37  | Algeria                     | 4                      | 0.29    |
| 38  | Columbia                    | 4                      | 0.29    |
| 39  | Egypt                       | 4                      | 0.29    |
| 40  | Estonia                     | 3                      | 0.21    |

| No. | Country              | gold | silver | bronze | Total number of medals | M index |
|-----|----------------------|------|--------|--------|------------------------|---------|
| 41  | Egypt                | 0    | 1      | 1      | 2                      | 0.14    |
| 42  | Latvia <sup>F</sup>  | 0    | 0      | 2      | 2                      | 0.14    |
| 43  | Australia            | 0    | 0      | 2      | 2                      | 0.14    |
| 44  | Slovakia             | 0    | 1      | 0      | 1                      | 0.07    |
| 45  | Taiwan               | 0    | 1      | 0      | 1                      | 0.07    |
| 46  | Tajikistan           | 0    | 0      | 1      | 1                      | 0.07    |
| 47  | United Arab Emirates | 0    | 0      | 1      | 1                      | 0.07    |
| 48  | Kyrgyzstan           | 0    | 0      | 1      | 1                      | 0.07    |
| 49  | Serbia <sup>G</sup>  | 0    | 0      | 1      | 1                      | 0.07    |
| 50  | Croatia <sup>H</sup> | 0    | 0      | 1      | 1                      | 0.07    |
| 51  | Iceland              | 0    | 0      | 1      | 1                      | 0.07    |

| No. | Country              | Total number of points | P index |
|-----|----------------------|------------------------|---------|
| 41  | Portugal             | 3                      | 0.21    |
| 42  | Slovakia             | 3                      | 0.21    |
| 43  | Taiwan               | 3                      | 0.21    |
| 44  | Latvia <sup>F</sup>  | 2                      | 0.14    |
| 45  | Australia            | 2                      | 0.14    |
| 46  | Tajikistan           | 1                      | 0.07    |
| 47  | United Arab Emirates | 1                      | 0.07    |
| 48  | Kyrgyzstan           | 1                      | 0.07    |
| 49  | Serbia <sup>G</sup>  | 1                      | 0.07    |
| 50  | Croatia <sup>H</sup> | 1                      | 0.07    |
| 51  | Iceland              | 1                      | 0.07    |

<sup>A</sup> Germany: 3 x gold, 3 x silver, 15 x bronze, East Germany: 1-2-6, West Germany: 1-4-3, German Olympic Flag (1959-1968): 0-1-1; <sup>B</sup> Russia: 2 bronze medals as CIS (1992), 3 gold medals as USSR (1980, 1976, 1976), 3 silver as USSR (1976, 1988, 1972), 5 bronze (1964, 1964, 1972, 1988, 1980), and 1 Chechen bronze medal in 1988; <sup>C</sup> Georgia: 1 gold medal as CIS (1992), 2 gold medals as USSR (1980, 1972), 2 silver (1976, 1980), 6 bronze (1988, 1964, 1964, 1972, 1976, 1988); <sup>D</sup> Azerbaijan: 1 gold medal as CIS (1992); <sup>E</sup> Czech Republic: 1 bronze medal as Czechoslovakia (1980); <sup>F</sup> Latvia: 1 bronze medal as USSR (1980); <sup>G</sup> Serbia: 1 bronze medal as Yugoslavia (1976), Serb; <sup>H</sup> Croatia: 1 bronze medal as Yugoslavia (1981), Croat



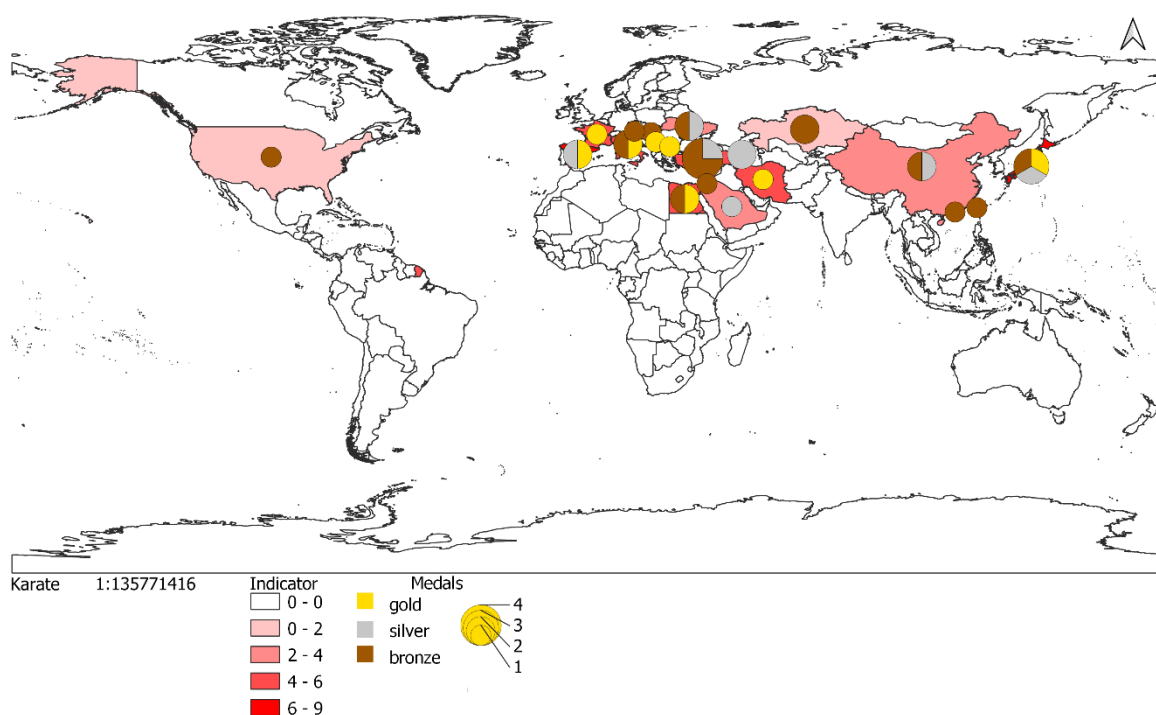
**Fig. 1.** Medals in judo and the index of point winning frequency (P) during the Olympic Games.

**Table 3.** Medals won by individual countries in karate

| No. | Country      | gold | silver | bronze | Total number of medals | M index |
|-----|--------------|------|--------|--------|------------------------|---------|
| 1   | Turkey       | 0    | 1      | 3      | 4                      | 4       |
| 2   | Japan        | 1    | 1      | 1      | 3                      | 3       |
| 3   | Azerbaijan   | 0    | 2      | 0      | 2                      | 2       |
| 4   | China        | 0    | 1      | 1      | 2                      | 2       |
| 5   | Egypt        | 1    | 0      | 1      | 2                      | 2       |
| 6   | Italy        | 1    | 0      | 1      | 2                      | 2       |
| 7   | Kazakhstan   | 0    | 0      | 2      | 2                      | 2       |
| 8   | Spain        | 1    | 1      | 0      | 2                      | 2       |
| 9   | Ukraine      | 0    | 1      | 1      | 2                      | 2       |
| 10  | Austria      | 0    | 0      | 1      | 1                      | 1       |
| 11  | Bulgaria     | 1    | 0      | 0      | 1                      | 1       |
| 12  | France       | 1    | 0      | 0      | 1                      | 1       |
| 13  | Hong Kong    | 0    | 0      | 1      | 1                      | 1       |
| 14  | Hungary      | 0    | 0      | 1      | 1                      | 1       |
| 15  | Iran         | 1    | 0      | 0      | 1                      | 1       |
| 16  | Jordan       | 0    | 0      | 1      | 1                      | 1       |
| 17  | Serbia       | 1    | 0      | 0      | 1                      | 1       |
| 18  | Saudi Arabia | 0    | 1      | 0      | 1                      | 1       |
| 19  | Taiwan       | 0    | 0      | 1      | 1                      | 1       |
| 20  | USA          | 0    | 0      | 1      | 1                      | 1       |

**Table 4.** Points won by individual countries in karate

| No. | Country      | Total number of points | P index |
|-----|--------------|------------------------|---------|
| 1   | Japan        | 9                      | 9       |
| 2   | Spain        | 8                      | 8       |
| 3   | Turkey       | 6                      | 6       |
| 4   | Azerbaijan   | 6                      | 6       |
| 5   | Egypt        | 6                      | 6       |
| 6   | Italy        | 6                      | 6       |
| 7   | Bulgaria     | 5                      | 5       |
| 8   | France       | 5                      | 5       |
| 9   | Iran         | 5                      | 5       |
| 10  | Serbia       | 5                      | 5       |
| 11  | China        | 4                      | 4       |
| 12  | Ukraine      | 4                      | 4       |
| 13  | Saudi Arabia | 3                      | 3       |
| 14  | Kazakhstan   | 2                      | 2       |
| 15  | Austria      | 1                      | 1       |
| 16  | Hong Kong    | 1                      | 1       |
| 17  | Hungary      | 1                      | 1       |
| 18  | Jordan       | 1                      | 1       |
| 19  | Taiwan       | 1                      | 1       |
| 20  | USA          | 1                      | 1       |



**Figure 2.** Medals in karate and the index of point winning frequency (P) during the Olympic Games

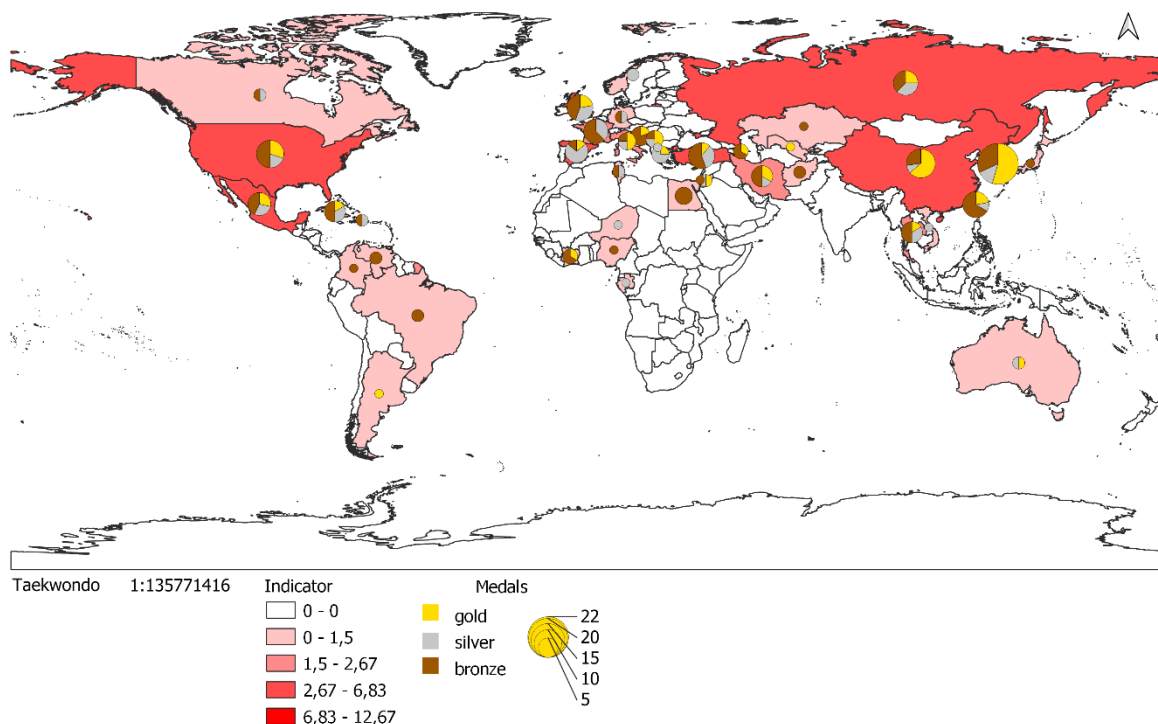
**Table 5.** Medals won by individual countries in taekwondo.

| No. | Country             | gold | silver | bronze | Total number of medals | M index |
|-----|---------------------|------|--------|--------|------------------------|---------|
| 1   | South Korea         | 12   | 3      | 7      | 22                     | 3.67    |
| 2   | China               | 7    | 1      | 3      | 11                     | 1.83    |
| 3   | USA                 | 3    | 2      | 5      | 10                     | 1.67    |
| 4   | Great Britain       | 2    | 3      | 4      | 9                      | 1.50    |
| 5   | Turkey              | 1    | 3      | 5      | 9                      | 1.50    |
| 6   | Taiwan              | 2    | 1      | 6      | 9                      | 1.50    |
| 7   | Russia <sup>A</sup> | 2    | 3      | 3      | 8                      | 1.33    |
| 8   | France              | 0    | 3      | 5      | 8                      | 1.33    |
| 9   | Spain               | 1    | 5      | 1      | 7                      | 1.17    |
| 10  | Mexico              | 2    | 2      | 3      | 7                      | 1.17    |
| 11  | Iran                | 2    | 1      | 3      | 6                      | 1.00    |
| 12  | Thailand            | 1    | 2      | 3      | 6                      | 1.00    |
| 13  | Cuba                | 1    | 2      | 3      | 6                      | 1.00    |
| 14  | Croatia             | 1    | 0      | 4      | 5                      | 0.83    |
| 15  | Greece              | 1    | 3      | 0      | 4                      | 0.67    |
| 16  | Italy               | 2    | 1      | 1      | 4                      | 0.67    |
| 17  | Serbia              | 2    | 1      | 1      | 4                      | 0.67    |
| 18  | Egypt               | 0    | 0      | 4      | 4                      | 0.67    |
| 19  | Azerbaijan          | 1    | 0      | 2      | 3                      | 0.50    |
| 20  | Ivory Coast         | 1    | 0      | 2      | 3                      | 0.50    |
| 21  | Jordan              | 1    | 1      | 0      | 2                      | 0.33    |
| 22  | Australia           | 1    | 1      | 0      | 2                      | 0.33    |
| 23  | Norway              | 0    | 2      | 0      | 2                      | 0.33    |
| 24  | Germany             | 0    | 1      | 1      | 2                      | 0.33    |
| 25  | Tunisia             | 0    | 1      | 1      | 2                      | 0.33    |
| 26  | Dominican Republic  | 0    | 1      | 1      | 2                      | 0.33    |
| 27  | Canada              | 0    | 1      | 1      | 2                      | 0.33    |
| 28  | Brazil              | 0    | 0      | 2      | 2                      | 0.33    |
| 29  | Afghanistan         | 0    | 0      | 2      | 2                      | 0.33    |
| 30  | Venezuela           | 0    | 0      | 2      | 2                      | 0.33    |
| 31  | Argentina           | 1    | 0      | 0      | 1                      | 0.17    |
| 32  | Uzbekistan          | 1    | 0      | 0      | 1                      | 0.17    |
| 33  | Vietnam             | 0    | 1      | 0      | 1                      | 0.17    |
| 34  | North Macedonia     | 0    | 1      | 0      | 1                      | 0.17    |
| 35  | Gabon               | 0    | 1      | 0      | 1                      | 0.17    |
| 36  | Niger               | 0    | 1      | 0      | 1                      | 0.17    |
| 37  | Israel              | 0    | 0      | 1      | 1                      | 0.17    |
| 38  | Kazakhstan          | 0    | 0      | 1      | 1                      | 0.17    |
| 39  | Nigeria             | 0    | 0      | 1      | 1                      | 0.17    |
| 40  | Columbia            | 0    | 0      | 1      | 1                      | 0.17    |
| 41  | Japan               | 0    | 0      | 1      | 1                      | 0.17    |

<sup>A</sup> Russia: Russian Olympic Committee – change of name for doping 2-1-1 (2020)

**Table 6.** Points won by individual countries in taekwondo.

| No. | Country             | Total number of points | P index |
|-----|---------------------|------------------------|---------|
| 1   | South Korea         | 76                     | 12.67   |
| 2   | China               | 41                     | 6.83    |
| 3   | USA                 | 26                     | 4.33    |
| 4   | Great Britain       | 23                     | 3.83    |
| 5   | Russia <sup>A</sup> | 22                     | 3.67    |
| 6   | Spain               | 21                     | 3.50    |
| 7   | Turkey              | 19                     | 3.17    |
| 8   | Taiwan              | 19                     | 3.17    |
| 9   | Mexico              | 19                     | 3.17    |
| 10  | Iran                | 16                     | 2.67    |
| 11  | France              | 14                     | 2.33    |
| 12  | Thailand            | 14                     | 2.33    |
| 13  | Cuba                | 14                     | 2.33    |
| 14  | Greece              | 14                     | 2.33    |
| 15  | Italy               | 14                     | 2.33    |
| 16  | Serbia              | 14                     | 2.33    |
| 17  | Croatia             | 9                      | 1.50    |
| 18  | Jordan              | 8                      | 1.33    |
| 19  | Australia           | 8                      | 1.33    |
| 20  | Azerbaijan          | 7                      | 1.17    |
| 21  | Ivory Coast         | 7                      | 1.17    |
| 22  | Norway              | 6                      | 1.00    |
| 23  | Argentina           | 5                      | 0.83    |
| 24  | Uzbekistan          | 5                      | 0.83    |
| 25  | Egypt               | 4                      | 0.67    |
| 26  | Germany             | 4                      | 0.67    |
| 27  | Tunisia             | 4                      | 0.67    |
| 28  | Dominican Republic  | 4                      | 0.67    |
| 29  | Canada              | 4                      | 0.67    |
| 30  | Vietnam             | 3                      | 0.50    |
| 31  | North Macedonia     | 3                      | 0.50    |
| 32  | Gabon               | 3                      | 0.50    |
| 33  | Niger               | 3                      | 0.50    |
| 34  | Brazil              | 2                      | 0.33    |
| 35  | Afghanistan         | 2                      | 0.33    |
| 36  | Venezuela           | 2                      | 0.33    |
| 37  | Israel              | 1                      | 0.17    |
| 38  | Kazakhstan          | 1                      | 0.17    |
| 39  | Nigeria             | 1                      | 0.17    |
| 40  | Columbia            | 1                      | 0.17    |
| 41  | Japan               | 1                      | 0.17    |



**Figure 3.** Medals in taekwondo and the index of point winning frequency (P) during the Olympic Games.

a new field of research at the intersection of physical culture sciences and socio-economic geography (alongside with spatial management). It indicates the influence of geography on sport [33]. The analyses conducted provided cognitively interesting data. In terms of the number of medals won, Japan dominates in judo, Turkey in karate and South Korea in taekwondo. Conversely, in terms of the weight of medals won, Japan dominates in judo and in karate, and South Korea in taekwondo. The results obtained confirmed the hypothesis: the countries where judo, karate and taekwondo originated, dominate the Olympic competition in these Far Eastern combat sports. Judo and karate belong to the Japanese Budo group of martial arts and are associated with the history, culture and philosophy of Japan [34]. Taekwondo, on the other hand, is the national sport and traditional martial art of Korea linked to its history [35]. If we treat these sports as a national asset, competing in judo and karate is important to Japanese people, and competing in taekwondo is important to Koreans because these combat sports are strongly identified with these countries [36, 37].

But Turkey’s position in the number of medals won in karate is also important. Thanks to the geography of sport, it is known that sport in Turkey has always been one of the important pillars of the country’s life [38]. It is rare for a country to have an article in its constitution dedicated to sport encouraged through important state-level activities to improve the physical and mental health of citizens of all ages, to promote sport for everyone and to treat eminent athletes as a national asset [39]. Sport in Turkey is strongly supported by the state, and physical culture associations receive public subsidies to promote physical activity and pursue opportunities for international sport competition [40].

From the perspective of the present study, Turkey counts in karate. It was found that the number of medals won by Turkey at the Olympic Games in karate can be related to the division of the kumite competition into weight categories [26], strictly matching the somatic constitution of Turkish karatekas [41]. Moreover, training in the summer climate in Turkey is conducive to raising the level of fitness to a higher level [42]. On the other hand, it should be remembered that the Olympic



karate games were held for the first time ever and that Japan won only one medal less than Turkey, surpassing Turkey in the points classification. We assume that in the future, with a larger range of data available, Turkey's dominance in the number of medals won in karate will be lost to Japan.

There is one more aspect regarding sports competition on a global scale – CISM (*Conseil International du Sport Militaire*). Unfortunately, Japan is not a member of CISM, and karate is not competitive at the highest level in this organization of athlete-soldiers [43].

The educational value of the geography of Olympic combat sports should be noted here, as adepts learn geography by practicing combat sports. Alongside with the sports techniques, they study the tradition, culture and history of the countries of origin of Far Eastern combat sports [44]. The geography of Olympic combat sports also fits in well with the health-promoting mission of sport [45] and counters the phenomenon of neo-gladiatorism [46, 47]. In addition, an important novelty introduced into the physical culture sciences by the authors of this article is the Olympic Games medal winning frequency index (M) and the Olympic Games points winning frequency index (P). This article verifies them for the first time on selected combat sports

In the next stages of the research, data on the other Olympic combat sports will be analysed. The indicators proposed in this article will include the other combat sports played at the Olympic Games: boxing, fencing, modern pentathlon (one of the five events is fencing) and wrestling. In further stages, the examined features and indicators

will be confronted with the population, gross domestic product, gross domestic product per capita, human development index, government spending on physical culture and, in particular, on the level of combat sports training in each country. We emphasize two more points. Firstly, combat sports with Olympic status represent all three groups distinguished in the theory of combat sport (see glossary) [11]. Secondly, this and the announced work enrich our knowledge about the phenomenon of martial arts in the humanistic aspect and, in a sense, are an important justification for recognizing a new sub-discipline in the global science of martial arts [48], and thus also combat sports (especially with Olympic status [11]).

## CONCLUSIONS

The obtained results indicate the impact of geography on sport. The countries where judo, karate and taekwondo originated dominate the Olympic competition in these Far Eastern combat sports.

In addition, the presentation of medal achievements by means of the cartographic method made it possible to illustrate interesting regularities concerning the practice of these combat sports worldwide: karate is popular in a belt of countries in the temperate latitudes of the northern hemisphere; there is a large, compact "white spot" in taekwondo in Europe (no medals won by a group of post-socialist and Baltic countries); no medals in judo in the Scandinavian countries. Moreover, the discussed combat sports are evidently less popular in most of Africa, Oceania, Southeast Asia and the Indian subcontinent.

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