Systematic Review Using Neutrosophic Torgerson and Neutrosophic Vader to Determine the Impact of Mobile Applications in the Labor Integration of Disabled People

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Abstract

People with a disability are the most likely to end up unemployed. Knowing and finding new ways to integrate them into society is urgent in an increasingly dynamic and versatile world. The systematic Review of the literature (SRL) was developed covering the issue of labor integration of people with disabilities.. The main objective of the research was to determine the state of the art of research on Mobile Applications and their impact on the Labor Integration of People with Disabilities. The use of relationship coefficients between two neutrosophic numbers, through the Torgerson method, Allowed the evaluation of the applications by the experts. The results obtained highlight the importance of mobile technology in the process of ensuring that people with disabilities find the desired job, in addition, accessibility must be met for the correct development of the application for the various existing disabilities. By utilizing Neutro-VADER and Neutrosophy, the precision and efficiency of sentiment analysis are enhanced, especially when handling uncertain or unclear text and consulting with experts. By implementing a more intricate and refined sentiment analysis method, these tools can generate more practical and valuable perspectives regarding the sentiment of written or spoken language.

Keywords: Labor Integration; Neutrosophic Torgerson; Neutrosophic Vader

1. Introduction

The participation of people with disabilities in employment is seen as a difficult path or, in the worst case, unthinkable, without considering society's existing difficulties and prejudices. In addition, the state of the art about research on the integration of people with disabilities and its impact with mobile applications is not known. Aside from the disability itself, there are various limitations that many face. Employers affirm the successes and advantages of hiring people with disabilities, as it leads to various benefits, such as improving their quality of life and income [1, 2]. The use of mobile applications in people with disabilities is beneficial to essential sectors of their lives and improves the bond with family, friends and the work sector .

For this reason, mobile technology provides support to these people with disabilities since these days it is very common to have a smartphone at home. That is why a mobile application that includes the necessary resources for developing people with disabilities in the labor sector is a very important instrument. This document has allowed us to know state of the art about the use of mobile applications and how they influence the labor integration of people with disabilities.

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The systematic Review of the literature included the search for review articles related to the subject. However, these do not have the proper focus on using mobile applications for the labor integration of people with disabilities. Furthermore, they did not include analytic questions covered in this research. Consequently, not all research questions managed to be compared.

Mobile applications are the most used by people with disabilities and are essential to connect with the desired job. Developers must follow guidelines on this technology, as it is critical to comply with accessibility standards for people with visual disabilities. The use of technologies such as artificial intelligence, virtual reality, and mobile applications, provides promising development in their daily skills. They consider their needs among the existing applications and even develop applications focused only on these people. The study aimed to contribute to the area's understanding and examine the impact of mobile applications on labor integration for people with disabilities[3].

In this research, guidelines were used to develop the systematic Review following the PRISMA recommendations. The Mendeley tool was used, as well as RAj, an assistant based on Artificial Intelligence and Text Mining

The applied method was based on the guidelines for conducting a systematic review of the literature [4]. In the review method, the problems and objectives of the research were addressed, the search sources were identified, and the search strategies were elaborated, the studies were identified, the exclusion criteria, the studies were selected, the quality of the studies was evaluated, data was extracted, and the synthesis of the findings was carried out.

2. Neutrosophy

Firstly, let us properly expose the original definition of Neutrosophic Logic ([10,11]).

Definition 1. Let X be a universe of discourse. Three membership functions characterize a Neutrosophic Set (NS) $u_A(x), r_A(x), v_A(x): X \rightarrow]$, -0.1+[, which satisfies the condition $-0 \leq inf u_A(x) + inf r_A(x) + inf v_A(x) sup u_A(x) + sup r_A(x) + \sup v_A(x) \leq 3^+$ for all $x \in X$. $u_A(x), r_A(x)$ and $v_A(x)$ denote the true, indeterminate, and false membership functions of x in A, respectively, and their images are standard or nonstandard subsets of -0,1+[[17].

Definition 2. Let X be a universe of discourse. A Single Value Neutrosophic Set (SVNS) A over X is an object of the form:

$$A = \{\langle x, u_A(x), r_A(x), v_A(x)\rangle : x \in X\} \quad (1)$$

Where $u_A, r_A, v_A: X \rightarrow [0,1]$, satisfy the condition $0 \leq u_A(x), r_A(x), v_A(x) \leq 3$ for all $x \in X$. $u_A(x), r_A(x)\ y\ v_A(x)$ denote the true, indeterminate, and false membership functions of x in A, respectively. For convenience, a Single Value Neutrosophic Number (SVNN) will be expressed as A = (a, b, c), where a, b, c [0,1] and satisfies $0 \leq a + b + c \leq 3$.

The SVNSs arose with the idea of applying the neutrosophic sets for practical purposes. Some operations between SVNN are expressed below:

1. Given A1 = (a1, b1, c1) and A2 = (a2, b2, c2), two SVNNs, the sum between A1 and A2 is defined as:
$$A_1 A_2 = (a_1 + a_2 - a_1 a_2, b_1 b_2, c_1 c_2) \quad (2)$$
2. Given A1 = (a1, b1, c1) and A2 = (a2, b2, c2), two SVNNs, the multiplication between A1 and A2 is defined as:
$$A_1 A_2 = (a_1 a_2, b_1 + b_2 - b_1 b_2, c_1 + c_2 - c_1 c_2) \quad (3)$$
3. The product by a positive scalar with a SVNN, A = (a, b, c) is defined by:
$$A = (1 - (1 - a), b, c) \quad (4)$$

Group decision-making is important in any decision-making process to achieve a favorable solution. In the group decision making process, all the evaluations of the individual decision-makers must be added to an aggregate neutrosophic decision matrix[4-6].

The concept of Aggregation operator in neutrosophy[7-9] formally defined in Definition 1[10].

Definition 1 Let *X* be a universe of discourse, a space of points (objects) and *x* denotes a generic element of *X*. ***A*** is a *Single Valued Neutrosophic Aggregation Operator* (SVNAO) if it is a mapping ***A***: $\cup_{n\in\mathbb{N}} ([0,1]^3)^n \rightarrow [0,1]^3$.

This can be done using the single valued neutrosophic weighted average aggregation (SVNWA) operator proposed[3, 10-12].

Definition 4 Let $a_j = \langle T_j, I_j, F_j \rangle$, j = 1, 2, … n, be a collection of single valued neutrosophic numbers, then, the *Single Valued Neutrosophic Weighted Average operator* (SVNWA), is defined by the formula in Equation 5.

$$SVNWA_W(a_1, a_2, \ldots, a_n) = \langle 1 - \prod_{j=1}^{n} (1 - T_j)^{w_j}, \prod_{j=1}^{n} I_j^{w_j}, \prod_{j=1}^{n} F_j^{w_j} \rangle \quad (5)$$

Where, W = (w_1, w_2, …, w_n) is the vector of weights, according to the importance assigned to every one of the attributes, such that, $w_i \in [0, 1]$ for i = 1, 2, …, n and $\sum_{i=1}^{n} w_i = 1$.

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Decision-making normally involves human language or commonly known as linguistic variables. A linguistic variable simply represents words or terms used in the human language[13]. Therefore, this linguistic variable approach is a convenient way for decision makers to express their assessments. Criterion scores can be expressed using linguistic variables. Linguistic variables can be transformed in SVNS as shown in Table 4[14].

Table 1: Linguistic variable and single-valued neutrosophic numbers

Variable	SVNN
Excellent	(0.9;0.1;0.1)
Highly effective	(0.75;0.25;0.20)
Effective	(0.50;0.5;0.50)
Little Effective	(0.35;0.75;0.80)
Ineffective	(0.10;0.90;0.90)

With the Torgerson Mathematical model, objectivity is given to the criteria of the experts or other personnel surveyed by converting the ordinal scale into an interval scale[15]. This is given because the scales used for the judgments and criteria the expert's value are ordinal; that is, they can be used to rank (e.g., Indispensable, Very Useful, Useful, Useless, etc.) qualitative parameters. To determine in which category each of the indicators is found, the limit value N (average) is subtracted from the average of the evaluations obtained in each indicator, and in this way, its result can be compared with the cut-off points. In such a way, if the calculated value is less than or equal to the cut-off point, the indicator analyzed belongs to this interval.

3.1 Neutrosophy for sentiment analysis

Throughout time, there have been several computational approaches to analyze sentiment, including the Valence Aware Dictionary for Sentiment Reasoning (VADER) method [16]. VADER is an open-source tool with a MIT license that was initially designed to analyze sentiment in social media. The method relies on rules that determine the polarity of emotions expressed in opinions by using a lexicon, which is an organized list of words associated with a language, a person, a region, a subject, or a specific period.

Initially developed for sentiment analysis on Twitter, VADER employs a supervised method that uses the speaker's lexical knowledge about a language to classify opinions. The lexicon includes words such as acronyms, emoticons, abbreviations, and initials, which are evaluated based on rules that determine whether an opinion is positive, negative, or neutral, depending on the number of positive and negative words contained in the opinion. The VADER lexicon comprises 7,517 words, including emoticons, abbreviations, acronyms, and initials, each labeled with a valence score ranging from -4 to 4. The lexicon was created using a Machine Learning technique called Wisdom-of-Crowds, which combines group wisdom and the use of other lexicons (LIWC, ANEW, GI). The polarity classification of an opinion is based on the valence scores of the words in the lexicon[17].
Another way to enhance sentiment analysis accuracy is by incorporating the philosophy of neutrosophy along with the VADER method. Neutrosophy is a branch of philosophy that studies the meaning of neutrality, which can be very useful in detecting opinions that are not entirely positive or negative. By integrating neutrosophy into VADER, a more precise classification of opinions can be achieved, allowing for the detection of the presence of neutral sentiment. Therefore, combining neutrosophy with the VADER method can enhance sentiment analysis capability and provide a more complete picture of public opinion on social media. The Neutro-VADER assigns positive, neutral, and negative sentiment scores to each Review concerning the product feature[18]. The neutrosophic VADER (Valence Aware Dictionary and sEntiment Reasoner) algorithm uses a mathematical formulation to calculate the polarity of a word. The basic idea is to assign a score to each word that indicates its positive, negative, and neutral polarity.

Let w be a word and let P(w), N(w), and U(w) be the scores representing the positive, negative, and neutral polarity of the word, respectively. These scores are calculated using the following formulas[19]:

$$P(w) = \left(p_{pos} + alpha * p_{neu}\right) * f(w) \quad (2)$$

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$$N(w) = \left(p_{neg} + alphan_{neu}\right) * f(w) \quad (3)$$
$$U(w) = \left(1 - f(w)\right) - P(w) - N(w) \quad (4)$$

where p_{pos}, p_{neg}, and p_{neu} are the probabilities of the word being positive, negative, and neutral, respectively, as estimated from a training corpus. n_{neu} is the probability of the word being neutral in the training corpus. The parameter $alpha$ is a tuning parameter that controls the influence of the neutral probability. f(w) is a function that determines the degree to which the word appears in the training corpus, and it is defined as:

$$f(w) = \min\left(\max\left(\frac{freq(w)}{(k + freq(w))}, lower\right), upper\right) \quad (5)$$

Where freq(w) is the frequency of the word in the training corpus, k is a smoothing parameter, and lower and upper are lower and upper bounds on the frequency. These bounds prevent extremely rare or extremely common words from dominating the polarity calculation.
A SVNN can represent the polarities of the text , and A SVNN for sentiment analysis can be represented by (P(w), U(w),N(w)) .The overall polarity score ranges from -1 to 1.

4 Methods

3.1 Research problems and objectives

To begin with the development of the systematic Review of the literature, the research questions (RQ) relevant to the search, extraction and data analysis strategy are established. When determining the RQs, the objectives were also formulated, and are shown below in Table 1.

Table 2: Research questions and objectives.

Research Question	Objective
RQ1. What Programming Languages are used to develop mobile applications?	Determine the programming languages used to develop mobile applications
RQ2. What publication media are the objectives of the investigations in the area?	Detail which publication media are the objectives of the investigations in the area
RQ3. Who are the most productive authors in the development of mobile applications for the Labor Integration of People with Disabilities?	Recognize the most productive authors in the development of mobile applications for the Labor Integration of People with Disabilities
RQ4. How have the concepts most used in research on mobile applications and their influence on the labor integration of people with disabilities evolved?	Determine the evolution of the most used concepts in research on mobile applications and their influence on the labor integration of people with disabilities
RQ5. What are the most cited articles whose Conclusions and Discussions are characterized by their high Objectivity and low Polarity in research on Mobile Applications and their influence on the labor integration of people with disabilities?	Identify the most cited articles whose Conclusions and Discussions are characterized by their high Objectivity and low Polarity in research on Mobile Applications and their influence on the labor integration of people with disabilities

4.1 Information sources and search strategies

The information sources included were Taylor & Francis Online, ARDI, Google Scholar, IEEE Xplore, Science Direct, Scopus, Microsoft Academic, Wiley Online Library and ACM Digital Library. The search strategy includes the use of descriptors important to the study (Table 2). Synonyms (separated by /) were added to descriptors such as mobile application and labor integration to optimize the number of relevant studies.

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Table 3: Search descriptors and their synonyms.

Descriptor
Mobile application / app / apps
Labor integration / employment / job / job search
People with disabilities
Method/ Methodology/ Model

The process carried out for the search for scientific articles has been executed using search queries based on Boolean logic, as shown in Table 3.

Table 4: Sources and search queries.

Source	Search Query
Taylor & Francis Online	[[All: app*] OR [All: apps] OR [All: "mobile app"] OR [All: "mobile phone"] OR [All: "mobile application"]] AND [[All: job*] OR [All: "labor integration"] OR [All: "job search"] OR [All: "employment"] OR [All: work*]] AND [All: "people with disabilities"] AND [[All: model] OR [All: methodology] OR [All: method]]
ARDI	(app* OR apps OR "mobile app" OR "mobile phone" OR "mobile application") AND (job* OR "labour integration" OR "job search" OR "employment" OR work*) AND ("people with disabilities") AND (model OR methodology OR method)
Google Scholar	(app* OR apps OR "mobile app" OR "mobile phone" OR "mobile application") AND (job* OR "labour integration" OR "job search" OR "employment" OR work*) AND ("people with disabilities") AND (model OR methodology OR method)
IEEE Xplore	(("All Metadata":app* OR "All Metadata":apps OR "All Metadata":mobile app OR "All Metadata": "mobile phone" OR "All Metadata": "mobile application") AND ("All Metadata": ": job* OR "All Metadata": "labour integration" OR "All Metadata": "job search" OR "All Metadata": employment OR "All Metadata":work*) AND "All Metadata": "people with disabilities " AND ("All Metadata":model OR "All Metadata":methodology OR "All Metadata":method))
Scopus	ALL ((app* OR apps OR "mobile app" OR "mobile phone" OR "mobile application") AND (job* OR "labour integration" OR "job search" OR "employment" OR work*) AND ("people with disabilities") AND (model OR methodology OR method))
Microsoft Academic	(app OR mobile app) AND (job OR labor integration OR job search OR employment) AND (people with disabilities) AND (model OR methodology OR method)
Wiley Online Library	"app* OR apps OR "mobile app" OR "mobile phone" OR "mobile application"" anywhere and "job* OR "labour integration" OR "job search" OR "Employment" OR work*" anywhere and ""people with disabilities"" anywhere and "model OR methodology OR method" anywhere
ACM Digital Library	[[All: app*] OR [All: apps] OR [All: "mobile app"] OR [All: "mobile phone"] OR [All: "mobile application"]] AND [[All: job*] OR [All: "labor integration"] OR [All: "job search"] OR [All: "employment"] OR [All: work*]] AND [All: "people with disabilities"] AND [[All: model] OR [All: methodology] OR [All: method]]

4.2 Identified studies

At the end of the article search, the amounts shown in Figure 1 are obtained for each source.

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Figure 1: Studies identified by source.

4.3 Exclusion criteria

The exclusion criteria (EC) were rigorously defined in order to select the most important ones for the investigation. The articles were reviewed according to the following criteria:

EC1: The articles do not propose a solution to the labor integration of people with disabilities.
EC2: Articles are older than 5 years.
EC3: Articles are not written in English.
EC4: Articles were not published in peer-reviewed conferences or journals.
EC5: Articles are not unique.
EC6: The titles or keywords of the articles are not very relevant.
EC7: The abstract of the articles is not very relevant.

4.4 Selection of studies

In the initial search, 100322 articles were obtained using the descriptors chosen for the study. In order to reduce such a number of articles, it is necessary to carry out the selection and filtering of the studies. The result of this stage is 82 articles, as shown in Figure 2.

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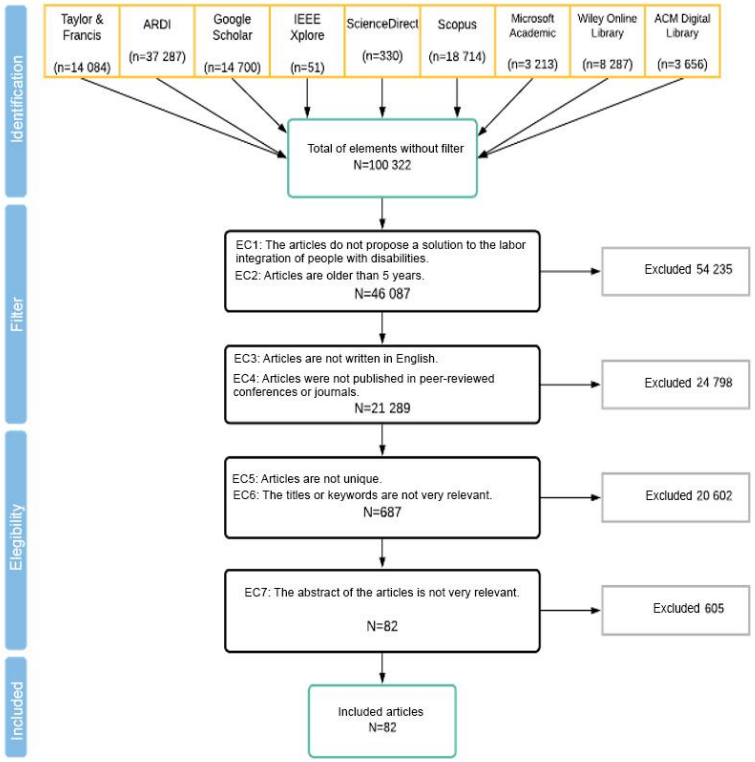

Figure 2: PRISMA Flow Diagram

4.5 Quality assessment

It was carried out through the formulation and application of a series of quality assessments (QA). The quality assessment was used as the last filter of the articles. QAs were applied to assess the quality of the research work according to established research questions:

QA1. Is the document well organized?
QA2. Is the experiment carried out adequate and acceptable?
QA3. Does the document explain the context in which the research was conducted?
QA3. Is the data set used clearly identified?
QA4. Does the document explain the context in which the research was conducted?
QA5. Does the document belong to a journal or conference?
QA6. Are the methods used to analyze the results appropriate?
QA7. Are the results of the experiments performed clearly identified and reported?

Taken together, the QAs provide a measure to ensure that each of the studies makes a valuable contribution to the systematic Review. The 7 QAs were rated on a dichotomous scale (“yes” or “no”). It should be noted that, having previously carried out a rigorous review, of the studies evaluated for quality assurance, the 82 articles have been preserved. All disagreements were resolved based on the authors' discretion.

4.6 Data extraction

Considering all the selected articles, these will be important to be able to answer the research questions. The following information was extracted from each article: article ID, article title, URL, source, year, country, number of pages, language, type of publication, publication name, authors, affiliation, number of citations, abstract, keywords and sample size. It is important to note that not all articles helped answer all RQs. **Synthesis of findings**

As the last step of the review method, with the information from the extracted data, the research questions were answered. This helped uncover patterns in the data and trends in research that was conducted over the past 5 years.

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5 Results and discussion

4.1 Overview of studies

4.2 In the SRL of the studies, it was found that the United States and the United Kingdom are the countries where more research is carried out on the use of mobile applications for the labor integration of people with disabilities.

Of the 82 selected studies, these were distributed chronologically from 2016 to 2021. The studies included in the years 2020 and 2018 are significantly larger. In addition, in the years 2019 and 2016, a considerable number of articles were published. According to the authors [14], in 2020 and 2018 are the years where more research articles using mobile applications were published. According to [15], the years with the highest scientific production in the area are 2016, 2018 and 2020.

4.3 Neutrosophic study

To empirically evaluate the effectiveness criteria of the information sources, the neutrosophics Torgerson method was applied, with the classifications of Excellent (EX), Very Effective (VE), Effective (E), Little Effective (LE) and, Ineffective (IN), obtaining the following results[15, 21].
The study and surveys were carried out based on the criteria on the results in the searches and how useful they were to the users. In this sense, the experts provided their criteria regarding the effectiveness of each of the research sources (Tables 4 and 5).

Table 5: Frequency established according to expert criteria..

Source	IN	LE	E	VE	EX	TOTAL
ACM Digital Library	5	9	6	12	4	36
ARDI	3	11	4	16	2	36
Wiley Online Library	9	9	8	4	6	36
Taylor & Francis Online	3	8	7	15	3	36
Scopus	6	10	9	15	0	36
IEEE Xplore	3	9	5	15	8	36
Microsoft Academic	2	13	7	14	0	36
google scholar	1	13	3	13	6	36

Table 1: Calculation of cut-off points and scale of the indicators.

Source	5	4	3	2	1	Average	N - Avg.
ACM Digital Library	-1.09	-0.28	0.14	1.22	3.50	0.70	**0.07**
ARDI	-1.38	-0.28	0.00	1.59	3.50	0.69	**0.08**
Wiley Online Library	-0.67	0.00	0.59	0.97	3.50	0.88	**-0.11**
Taylor & Francis Online	-1.38	-0.51	0.00	1.38	3.50	0.60	**0.17**
Scopus	-0.97	-0.14	0.51	3.50	3.50	1.28	**-0.51**
IEEE Xplore	-1.38	-0.43	-0.07	0.76	3.50	0.48	**0.29**
Microsoft Academic	-1.59	-0.21	0.28	3.50	3.50	1.10	**-0.33**
Google Scholar	-1.91	-0.28	-0.07	0.97	3.50	0.44	**0.33**

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Cut points	**-1.30**	**-0.27**	**0.17**	**1.74**	**3.50**	**N =**	**0.77**

As a result of the neutrosophic study, it was possible to determine that, of the sources of scientific information, Google Scholar stands out as the one with the best scientific benefits for users. As shown in the numerical ray that illustrates the levels of effectiveness of the information sources (Figure 5), it is followed by IEEE Xplorer, ARDI, ACM Digital Library, Wiley Online and, those of less use compared to those already mentioned, Scopus and Microsoft Academic.

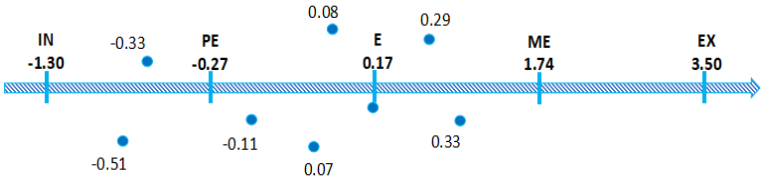

Figure 3: Graphic analysis of the result with experts, from the calculation of cut-off points.
Answers to research questions

RQ1. What Programming Languages were used to develop mobile applications?

Table 6 shows the programming languages most used in research, of which Java (10%) and Swift (4%) are the most used for the development of mobile applications.

Table 2: Programming languages to develop mobile applications.

Programming language	Qty. (%)
Java	9(45)
swift	4(20)
C#	3(15)
JavaScript	3(15)
Python	1(5)

Although Java turns out to be the most used language in research, it is important to mention how little the programming language used to develop the application is mentioned. According to [30], it is validated that Java is the language most used in research on labor integration. For the author [2], Swift is the language that appears the most in research.

RQ2. What publication media are the objectives of the investigations in the area?

Figure 6 presents a graph with the types of publication included in the systematic Review. Based on this, the 53 publications made in scientific journals (64.6%) stand out, which greatly exceed the 29 publications made in conferences (35.4%).

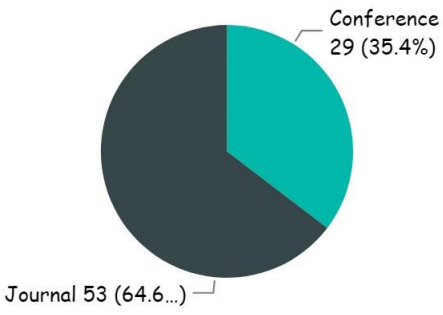

Figure 4: Articles by publication. Source:

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In addition, Table 7 shows the number of publications by means of publication and by source, with journals and Google Scholar being the most prominent.

Table 7: Media by source.

Publication Type-Source	Journal	Conference	Total
ACM Digital Library		4	**4**
ARDI	6		**6**
Google Scholar	25	21	**46**
IEEE Xplore	4	4	**8**
Microsoft Academic	3		**3**
ScienceDirect	1		**1**
Scopus	3		**3**
Taylor & Francis Online	7		**7**
Wiley Online Library	4		**4**
Total	**53**	**29**	**82**

The articles included in the systematic Review are characterized by being mostly published in journals, unlike those published in conferences, which are significantly fewer. In addition, Google Scholar is the source where more has been published, both in journals and in conferences. In accordance with[31], confirm that they found more relevant articles published in journals than in conferences. On the contrary, the authors[3]found more relevant studies in conferences.

RQ3. Who are the most productive authors in the development of mobile applications for the Labor Integration of People with Disabilities?

It is important to mention the most influential authors in the use of mobile applications for the labor integration of people with disabilities. It was classified by number of citations, and is shown in Table 8, where NA Capela et al., Catia Prandi et al. and Joyoje et Pal et al., obtained 63, 48, and 24 citations, respectively.

Table 8: Most productive authors by number of citations.

Authors	2016	2017	2018	2019	2020	2021	Total
NA Capela, ED Lemaire, N. Baddour, M. Rudolf, N. Goijar…	63						**63**
Catia Prandi, Marco Roccetti, Paola Salomoni, Valentina Nisi,..		48					**48**
Joyojeet Pal, Anandhi Viswanathan, Priyank Chandra,…		24					**24**
Cristina Jenaro, Noelia Flores, Maribel Cruz, Carmen Perez, …		21					**21**

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Simon Darcy, Jenny Green, Hazel Maxwell	16			**16**
Daniel K. Davies, Steven E. Stockm, Richard G. Herold, Mic…		13		**13**
Mohanraj Thirumalai, James H. Rimmer, George Johnson, Je…		12		**12**
Diego Mayordomo-Martínez, Juan-Carlos Sánchez-Aarnouts…			11	**11**
Joanne Nicholson, Elizabeth A. Carpenter-Song, Lynn H. Ma…	10			**10**
Natalina Martinello, Werner Eisenbarth, Christine Lehane, A…			10	**10**
Javier Gomez, Juan Carlos Torrado, German Montoro		7		**7**
Kanwal Yousaf, Zahid Mewhmood, Tanzila Saba, Amj…		7		**7**
Michael Dunn, Brenda Barrio, Yun-Ju Hsiao	7			**7**
Georgios Kouroupetroglou, Alexandros Pino, Paraskevi Riga	6			**6**
Daniel K. Davies, Steven E. Stock, Cameron D. Davies, Mich…		5		**5**
Rakesh Babu, Donald Heath			5	**5**
Ghassan Kbar, Ahmad Al-Daraiseh, Syed Hammad Mian, …	4			**4**

The authors NA Capela et al. and Catia Prandi et al. They are significantly more productive than the rest, and their articles were published in 2016 and 2017 respectively. According to [32], they validate that NA Capela et al. are the most productive authors and contribute to research on mobile applications and labor integration.

RQ4. How have the concepts most used in research on mobile applications and their influence on the labor integration of people with disabilities evolved?

To determine the evolution of the concepts embodied as a portfolio, they are classified based on bigrams (relevant word pairs) in the research articles. This is represented as CORE which are the bigrams present in many articles with a large number of citations. The EMERGING quadrant contains the bigrams that appear a lot in the last 3 years. DECLINING represents the bigrams that appear little in the last 3 years. Finally, the ESTABLISHED quadrant contains the bigrams that appear a lot with citations greater than 5 and less than 15.

The evolution of the concepts classified as bigrams highlights that "mobile application" and "visual impairment" have been presented very frequently in recent years. Articles with more than 5 citations and less than 15 citations contain bigrams such as "assistive technology" and "focus group" which are the most prominent. It should be noted

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that this type of response was not found in the systematic reviews reviewed for this research, so it has not been possible to make a comparison.

RQ5. What are the most cited articles whose Conclusions and Discussions are characterized by their high Objectivity and low Polarity in research on Mobile Applications and their influence on the labor integration of people with disabilities?

Table 9 shows the answer to the question, with its results ordered by a number of citations, with its objectivity, polarity, calculated with Neutro-VADER, year, and source. It is observed that the 3 most cited articles are very objective and have low polarity, which is highly relevant; they were published between 2016 and 2017 and are also found in the sources of Google Scholar and ACM Digital Library.

Table 9: Articles most cited for their Objectivity and Polarity.

Paper Title	NoQuotes	Objetivity	Polarity	Year	Source
[55] Evaluation of a smartphone	63	0.63	0.01	2016	Google Scholar
[12] Fighting exclusion: a multi	48	0.62	0.09	2017	Google Scholar
[35] Agency in assistive technol	24	0.66	0.03	2017	ACM Digital Library
[13] Internet and cell phone usa	21	0.62	0.07	2017	Willey Digital Library
[72] I've got a mobile phone too	16	0.60	0.13	2016	Microsoft Academic
[15] GeoTalk: a GPS-Enabled Port	13	0.64	0.06	2018	Google Scholar
[53] Teams (Tele-exercise and mu	12	0.57	0.01	2018	Google Scholar
[18] Design and development of a	11	0.62	0.05	2019	Google Scholar
[33] Developing the WorkingWell	10	0.63	0.09	2016	Microsoft Academic
[58] Exploring the use of smartp	10	0.73	0.03	2019	Taylor & Francis
[30] Using smartphones to assist	7	0.62	0.07	2017	Google Scholar
[40] A Novel Technique for Speec	7	0.45	0.10	2018	ARDI
[51] Do Ipad Applications Help S	7	0.45	-0.10	2016	Google Scholar

In this systematic literature review, the most cited article stands out for its high objectivity and low polarity. A graph is also shown with the amounts of articles grouped according to the objectivity of their discussions and Conclusions, as shown in Figure 8.

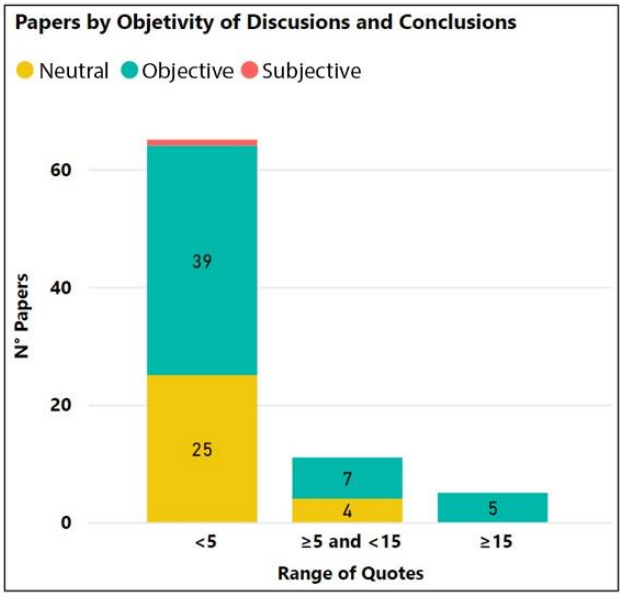

Figure 5: Articles according to the objectivity of their discussions and conclusions

The largest number of articles (with less than 5 citations) stand out for their neutrality and high objectivity. Articles with citations greater than 15 are characterized by being very objective. Unfortunately, no systematic reviews were found with this type of analysis with which to make comparisons.

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4. Conclusions

To conclude with the Review, this study broadened the scope of how mobile applications significantly impact the labor integration of people with disabilities in the investigations carried out from 2016 to 2021. The use of neutrosophic variables provided a safe look at obtaining of information based on expert criteria. It was concluded that, like the rest of the investigative methods used, computer applications are a window to the world for disabled people. Significant findings are highlighted, such as RQ1, where Java is highlighted as the most widely used programming language. In RQ2, the result was that more research is published in scientific journals than in Congresses. For the response to RQ3, it is worth mentioning that the most cited article reports 63 citations. The response to RQ4 shows the evolution of the concepts, classifying them as bigrams, highlighting "mobile application" and "figure shows" as the ones that appear the most in the reviewed and analyzed articles. Finally, the response to RQ5 shows a classification of the articles analyzed based on the objectivity and polarity of their discussions and conclusions. The novel answers for RQ4 and RQ5 were not found in the systematic review articles consulted for comparisons. The use of Neutro-VADER and Neutrosophy improve the accuracy and effectiveness of the analysis, mainly when dealing with indeterminate or ambiguous text and experts opinions. By incorporating a more nuanced and sophisticated approach to sentiment analysis, these tools can provide more valuable and actionable insights into the sentiment of natural language text.

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