

PIXEL BIT

Nº 71 SEPTIEMBRE 2024
MONOGRÁFICO

e-ISSN:2171-7966
ISSN:1133-8482

Revista de Medios y Educación

la inclusión educativa - Tecnologías emergentes y recursos didáctico-tecnológicos para

PB



PIXEL-BIT

REVISTA DE MEDIOS Y EDUCACIÓN

Nº 71 - SEPTIEMBRE - 2024

<https://revistapixelbit.com>

Pixel-Bit: Revista de Medios y Educación. 2024 - ISSN: 1133-8482. e-ISSN: 2171-7966.

EQUIPO EDITORIAL (EDITORIAL BOARD)**EDITOR JEFE (EDITOR IN CHIEF)**

Dr. Julio Cabero Almenara, Departamento de Didáctica y Organización Educativa, Facultad de CC de la Educación, Director del Grupo de Investigación Didáctica. Universidad de Sevilla (España)

EDITOR ADJUNTO (ASSISTANT EDITOR)

Dr. Juan Jesús Gutiérrez Castillo, Departamento de Didáctica y Organización Educativa. Facultad de CC de la Educación, Universidad de Sevilla (España)

Dr. Óscar M. Gallego Pérez, Grupo de Investigación Didáctica, Universidad de Sevilla (España)

EDITORES ASOCIADOS

Dra. Urtza Garay Ruiz, Universidad del País Vasco. (España)

Dra. Ivanovna Milqueya Cruz Pichardo, Pontificia Universidad Católica Madre y Maestra. (República Dominicana)

Dra. Carmen Llorente Cejudo, Universidad de Sevilla (España)

CONSEJO METODOLÓGICO

Dr. José González Such, Universidad de Valencia (España)

Dr. Antonio Matas Terrón, Universidad de Málaga (España)

Dra. Cynthia Martínez-Garrido, Universidad Autónoma de Madrid (España)

Dr. Luis Carro Sancristóbal, Universidad de Valladolid (España)

Dra. Nina Hidalgo Farran, Universidad Autónoma de Madrid (España)

CONSEJO DE REDACCIÓN

Dra. María Puig Gutiérrez, Universidad de Sevilla. (España)

Dra. Sandra Martínez Pérez, Universidad de Barcelona (España)

Dr. Selín Carrasco, Universidad de La Punta (Argentina)

Dr. Jackson Collares, Universidades Federal do Amazonas (Brasil)

Dra. Kitty Gaona, Universidad Autónoma de Asunción (Paraguay)

Dr. Vito José de Jesús Carioca. Instituto Politécnico de Beja Ciências da Educação (Portugal)

Dr. Elvira Esther Navas, Universidad Metropolitana de Venezuela (Venezuela)

Dr. Angel Puentes Puente, Pontificia Universidad Católica Madre y Maestra. Santo Domingo (República Dominicana)

Dr. Fabrizio Manuel Sirignano, Università degli Studi Suor Orsola Benincasa (Italia)

Dra. Sonia Aguilar Gavira. Universidad de Cádiz (España)

Dra. Eloisa Reche Urbano. Universidad de Córdoba (España)

CONSEJO TÉCNICO

Dra. Raquel Barragán Sánchez, Grupo de Investigación Didáctica, Universidad de Sevilla (España)

Dr. Antonio Palacios Rodríguez, Grupo de Investigación Didáctica, Universidad de Sevilla (España)

Dr. Manuel Serrano Hidalgo, Grupo de Investigación Didáctica, Universidad de Sevilla (España)

Diseño de portada: Dña. Lucía Terrones García, Universidad de Sevilla (España)

Revisor/corrector de textos en inglés: Dra. Rubicelia Valencia Ortiz, MacMillan Education (México)

Revisores metodológicos: evaluadores asignados a cada artículo

CONSEJO CIENTÍFICO

Jordi Adell Segura, Universidad Jaume I Castellón (España)

Ignacio Aguaded Gómez, Universidad de Huelva (España)

María Victoria Aguiar Perera, Universidad de Las Palmas de Gran Canaria (España)

Olga María Alegre de la Rosa, Universidad de la Laguna Tenerife (España)

Manuel Área Moreira, Universidad de la Laguna Tenerife (España)

Patricia Ávila Muñoz, Instituto Latinoamericano de Comunicación Educativa (México)

María Paz Prendes Espinosa, Universidad de Murcia (España)

Angel Manuel Bautista Valencia, Universidad Central de Panamá (Panamá)

Jos Beishuizen, Vrije Universiteit Amsterdam (Holanda)

Florentino Blázquez Entonado, Universidad de Extremadura (España)
Silvana Calaprince, Università degli studi di Bari (Italia)
Selín Carrasco, Universidad de La Punta (Argentina)
Raimundo Carrasco Soto, Universidad de Durango (México)
Zulma Cataldi, Universidad de Buenos Aires (Argentina)
Luciano Ceconi, Università degli Studi di Modena (Italia)
Jean-François Cerisier, Université de Poitiers, Francia
Jordi Lluís Coiduras Rodríguez, Universidad de Lleida (España)
Jackson Collares, Universidades Federal do Amazonas (Brasil)
Enricomaria Corbi, Università degli Studi Suor Orsola Benincasa (Italia)
Marialaura Cunzio, Università degli Studi Suor Orsola Benincasa (Italia)
Brigitte Denis, Université de Liège (Bélgica)
Floriana Falcinelli, Università degli Studi di Perugia (Italia)
Maria Cecilia Fonseca Sardi, Universidad Metropolitana de Venezuela (Venezuela)
Maribel Santos Miranda Pinto, Universidade do Minho (Portugal)
Kitty Gaona, Universidad Autónoma de Asunción (Paraguay)
María-Jesús Gallego-Arrufat, Universidad de Granada (España)
Lorenzo García Aretio, UNED (España)
Ana García-Valcarcel Muñoz-Repiso, Universidad de Salamanca (España)
Antonio Bautista García-Vera, Universidad Complutense de Madrid (España)
José Manuel Gómez y Méndez, Universidad de Sevilla (España)
Mercedes González Sanmamed, Universidad de La Coruña (España)
Manuel González-Sicilia Llamas, Universidad Católica San Antonio-Murcia (España)
António José Meneses Osório, Universidade do Minho (Portugal)
Carol Halal Orfali, Universidad Tecnológica de Chile INACAP (Chile)
Mauricio Hernández Ramírez, Universidad Autónoma de Tamaulipas (México)
Ana Landeta Etxeberria, Universidad a Distancia de Madrid (UDIMA)
Linda Lavelle, Plymouth Institute of Education (Inglaterra)
Fernando Leal Ríos, Universidad Autónoma de Tamaulipas (México)
Paul Lefrere, Cca (UK)
Carlos Marcelo García, Universidad de Sevilla (España)
Francois Marchessou, Universidad de Poitiers, París (Francia)
Francesca Marone, Università degli Studi di Napoli Federico II (Italia)
Francisco Martínez Sánchez, Universidad de Murcia (España)
Ivory de Lourdes Mogollón de Lujo, Universidad Central de Venezuela (Venezuela)
Angela Muschitiello, Università degli studi di Bari (Italia)
Margherita Musello, Università degli Studi Suor Orsola Benincasa (Italia)
Elvira Esther Navas, Universidad Metropolitana de Venezuela (Venezuela)
Trinidad Núñez Domínguez, Universidad de Sevilla (España)
James O'Higgins, de la Universidad de Dublín (UK)
José Antonio Ortega Carrillo, Universidad de Granada (España)
Gabriela Padilla, Universidad Autónoma de Tamaulipas (México)
Ramón Pérez Pérez, Universidad de Oviedo (España)
Angel Puentes Puente, Pontificia Universidad Católica Madre y Maestra. Santo Domingo (República Dominicana)
Juan Jesús Gutiérrez Castillo, Universidad de Sevilla (España)
Julio Manuel Barroso Osuna, Universidad de Sevilla (España)
Rosalía Romero Tena, Universidad de Sevilla (España)
Hommy Rosario, Universidad de Carabobo (Venezuela)
Pier Giuseppe Rossi, Università di Macerata (Italia)
Jesús Salinas Ibáñez, Universidad Islas Baleares (España)
Yamile Sandoval Romero, Universidad de Santiago de Cali (Colombia)
Albert Sangrà Morer, Universidad Oberta de Catalunya (España)
Ángel Sanmartín Alonso, Universidad de Valencia (España)
Horacio Santángelo, Universidad Tecnológica Nacional (Argentina)
Francisco Solá Cabrera, Universidad de Sevilla (España)
Jan Frick, Stavanger University (Noruega)
Karl Steffens, Universidad de Colonia (Alemania)
Seppo Tella, Helsinki University (Finlandia)
Hanne Wachter Kjaergaard, Aarhus University (Dinamarca)



FACTOR DE IMPACTO (IMPACT FACTOR)

SCOPUS Q1 Education: Posición 236 de 1406 (83% Percentil). CiteScore Tracker 2022: 5,6 - Journal Citation Indicator (JCI). Emerging Sources Citation Index (ESCI). Categoría: Education & Educational Research. Posición 257 de 739. Cuartil Q2 (Percentil: 65.29) - FECYT: Ciencias de la Educación. Cuartil 1. Posición 16. Puntuación: 35,68- DIALNET MÉTRICAS (Factor impacto 2021: 1.72. Q1 Educación. Posición 12 de 228) - REDIB Calificación Glogal: 29,102 (71/1.119) Percentil del Factor de Impacto Normalizado: 95,455- ERIH PLUS - Clasificación CIRC: B- Categoría ANEP: B - CARHUS (+2018): B - MIAR (ICDS 2020): 9,9 - Google Scholar (global): h5: 42; Mediana: 42 - Journal Scholar Metric Q2 Educación. Actualización 2016 Posición: 405a de 1,115- Criterios ANECA: 20 de 21 - INDEX COPERNICUS Puntuación ICV 2019: 95.10

Pixel-Bit, Revista de Medios y Educación está indexada entre otras bases en: SCOPUS, Fecyt, DOAJ, Iresie, ISOC (CSIC/CINDOC), DICE, MIAR, IN-RECS, RESH, Ulrich's Periodicals, Catálogo Latindex, Biné-EDUSOL, Dialnet, Redinet, OEI, DOCE, Scribd, Redalyc, Red Iberoamericana de Revistas de Comunicación y Cultura, Gage Cengage Learning, Centro de Documentación del Observatorio de la Infancia en Andalucía. Además de estar presente en portales especializados, Buscadores Científicos y Catálogos de Bibliotecas de reconocido prestigio, y pendiente de evaluación en otras bases de datos.

EDITA (PUBLISHED BY)

Grupo de Investigación Didáctica (HUM-390). Universidad de Sevilla (España). Facultad de Ciencias de la Educación. Departamento de Didáctica y Organización Educativa. C/ Pirotecnia s/n, 41013 Sevilla.

Dirección de correo electrónico: revistapixelbit@us.es . URL: <https://revistapixelbit.com/>

ISSN: 1133-8482; e-ISSN: 2171-7966; Depósito Legal: SE-1725-02

Formato de la revista: 16,5 x 23,0 cm

Los recursos incluidos en Pixel Bit están sujetos a una licencia Creative Commons Attribution-NonCommercial-ShareAlike 4.0 Unported (Reconocimiento-NoComercial-CompartirIgual)(CC BY-NC-SA 4.0), en consecuencia, las acciones, productos y utilidades derivadas de su utilización no podrán generar ningún tipo de lucro y la obra generada sólo podrá distribuirse bajo esta misma licencia. En las obras derivadas deberá, asimismo, hacerse referencia expresa a la fuente y al autor del recurso utilizado.

©2024 Pixel-Bit. No está permitida la reproducción total o parcial por ningún medio de la versión impresa de Pixel-Bit.

- 1.- Percepciones de autoeficacia en docentes en formación en España: un estudio de caso de microenseñanza utilizando realidad virtual inmersiva // Self-efficacy beliefs in Spanish pre-service teachers: a microteaching case study using immersive virtual reality** 7
María Esther Rodríguez-Gil, Bianca Manuela Sandu, Beatriz Santana-Perera
- 2.- Explorando tendencias sociales en las discusiones sobre cohousing y coliving en X(Twitter) mediante el uso de técnicas de PNL y de análisis de texto // Exploring social trends in cohousing and coliving discussions on X(Twitter) using NLP and Text Analysis Techniques** 25
Rafael Sosa-Ramírez, Esteban Vázquez-Cano, Norberto Díaz-Díaz, Eloy López-Meneses
- 3.- Enmarcando las aplicaciones de IA generativa como herramientas para la cognición en educación // Framing Generative AI applications as tools for cognition in education** 42
Marc Fuertes-Alpiste
- 4.- An Assessment of Technological Pedagogical Content Knowledge (TPACK) among Pre-service Teachers: A Rasch Model Measurement // Evaluación del conocimiento tecnológico pedagógico del contenido (TPACK) entre los profesores en formación: modelo de medición Rasch** 59
Komarudin Komarudin, Suherman Suherman
- 5.- Rasch Measurement Validation of an Assessment Tool for Measuring Students' Creative Problem-Solving through the Use of ICT // Validación de una Herramienta de Evaluación Basada en el Modelo Rasch para Medir la Resolución Creativa de Problemas en Estudiantes Mediante el Uso de TIC** 83
Farida Farida, Yosep Aspat Alamsyah, Bambang Sri Anggoro, Tri Andari, Restu Lusiana
- 6.- Influencia de la Realidad Virtual en el rendimiento académico en Educación Secundaria a través de un meta-análisis // Influence of Virtual Reality on Academic Performance in Secondary Education Through a Meta-Analysis** 107
Juan José Victoria-Maldonado, Arturo Fuentes-Cabrera, José Fernández-Cerero, Fernando José Sadio-Ramos
- 7.- Tecnologías abiertas e inclusivas en la complejidad del futuro de la educación: diseño de modelo basado en investigación // Open and Inclusive Technologies in the Complexity of the Future of Education: Designing a Research-Based Model** 123
María Soledad Ramírez-Montoya, Inés Álvarez-Icaza, Joanne Weber, Fidel Antonio Guadalupe Casillas-Muñoz
- 8.- El uso de ChatGPT en la escritura académica: Un estudio de caso en educación // The use of ChatGPT in academic writing: A case study in Education** 143
Kevin Baldrich, Juana Celia Domínguez-Oller
- 9.- Inteligencia artificial: revolución educativa innovadora en la Educación Superior // Artificial Intelligence: innovative educational revolution in Higher Education** 159
Virginia Villegas-José, Manuel Delgado-García
- 10.- Análisis de la competencia digital en profesores de educación primaria en relación con los factores de género, edad y experiencia // Analysis of Digital Competence in Elementary School teachers according to their socio-demographic factors and experience** 171
Issac González-Medina, Eufrasio Pérez-Navío, Óscar Gavín Chocano

Exploring social trends in cohousing and coliving discussions on X(Twitter) using NLP and Text Analysis Techniques

Explorando tendencias sociales en las discusiones sobre cohousing y coliving en X(Twitter) mediante el uso de técnicas de PNL y de análisis de texto

  **Dr. Rafael Sosa-Ramírez**

Investigador Postdoctoral. Universidad Pablo de Olavide. España

  **Dr. Esteban Vázquez-Cano**

Profesor Titular de Universidad. UNED. España

  **Dr. Norberto Díaz-Díaz**

Profesor Titular de Universidad. Universidad Pablo de Olavide. España

  **Dr. Eloy López-Meneses**

Profesor Titular de Universidad. Universidad Pablo de Olavide. España

Recibido: 2024/01/07; **Revisado:** 2024/01/31; **Aceptado:** 2024/06/29; **Online First:** 2024/07/08; **Publicado:** 2024/09/01

ABSTRACT

The research analyses trends and variations in discussions related to cohousing and coliving in the X Social Network (formerly known as Twitter) between 2019 and 2022. Employing advanced text network analysis techniques, the research uses Python and Snsraper for text pre-processing, followed by network graph construction and community detection. The study employs Latent Dirichlet Allocation (LDA) models to identify the topics of discussion in tweets and calculates the tf-idf of bigrams within the main thematic clusters. This study evaluates the relative importance of these bigrams as a function of their frequency in the analysed documents. The results reveal a fractal pattern of influence propagation within the X Social Network. Key topics such as coworking spaces, rental flats and urban planning feature prominently in cohousing discussions, demonstrating the multifaceted impact of cohousing models on diverse populations. This research provides essential insight into the intricate landscape of cohousing conversations, highlighting the pivotal role of cohousing models in addressing contemporary challenge.

RESUMEN

La investigación analiza las tendencias y variaciones en las discusiones relacionadas con cohousing y coliving en la red social X (anteriormente conocida como Twitter) entre 2019 y 2022. Utilizando técnicas avanzadas de análisis de redes de texto, la investigación utilizó Python y Snsraper para el preprocesamiento de texto, seguido por la construcción de gráficos de red y la detección de comunidades. El estudio emplea modelos de Asignación Latente de Dirichlet (LDA) para identificar los temas de discusión en los tweets y calcula el tf-idf de bigramas dentro de los principales clusters temáticos. Este estudio evalúa la importancia relativa de estos bigramas en función de su frecuencia en los documentos analizados. Los resultados revelan un patrón fractal de propagación de influencia dentro de la red social X. Temas clave como espacios de trabajo compartido, pisos en alquiler y planificación urbana destacan de manera prominente en las discusiones sobre la vivienda colaborativa, demostrando el impacto multifacético de los modelos de convivencia en diversas poblaciones. Esta investigación proporciona información esencial sobre el intrincado panorama de las conversaciones sobre la vivienda colaborativa, resaltando el papel fundamental de los modelos de convivencia en la atención de desafíos contemporáneos.

KEYWORDS · PALABRAS CLAVES

Collaborative housing, Cohousing, Coliving, Social networks, Urban planning
Vivienda colaborativa, Cohousing, Coliving, Redes sociales, Planificación urbana

1. Introduction

In contemporary societies, the complexity of economic relationships and the evolution of demographic transition are factors deeply embedded in the debates within international forums, governmental bodies, and civil society. The aging population is a major concern, with an expected doubling in the number of individuals over 65 years old to reach 1.6 billion by 2050 (United Nations, 2023), signifying an irreversible demographic trend. It's crucial to underline that this phenomenon is closely interlinked with various contemporary issues. Hence, there's a necessity to seek new residential models that offer fresh alternatives such as cohousing and coliving, in line with the Committee on Disability's definition of independent living environments "settings for living outside all types of residential institutions" (2017, p.5), without undermining the ability to choose amidst an imposition of a lifestyle. Particularly, this quest for alternatives and the surrounding knowledge gained increased urgency after the SARS-CoV-2 pandemic (Hsu et al., 2020). On an international level, the International Monetary Fund reported in 2022 that housing prices had surged nearly 80% from 2010 to 2022. Additionally, the European Union indicated that from 2010 to 2021, housing prices had escalated by 37% for purchasing and 16% for rentals (Eurostat, 2022). Last but not least, the growing problem of loneliness and social isolation is acknowledged as an escalating international issue, directly or indirectly linked to adverse physical health consequences (Chou et al., 2011; Crowe et al., 2021; Heinrich & Gullone, 2006). Data science and algorithms enable the discovery of valuable information for understanding socio-educational phenomena. In particular, scientists use algorithms to assess the influence of technological advancements in a field of knowledge (Salas, 2023).

The objective of this research is to identify the trends and discussion patterns on the social network X (formerly known as Twitter) related to 'Co-Housing' and 'Co-Living'. The goal is to comprehend how these concepts are mentioned and discussed within X's conversations, as well as to identify the most recurrent keywords and topics in tweets. The aim is to understand how these concepts are discussed and represented in X over time, identifying the most relevant themes and user interactions in this digital platform. Additionally, the intent is to use text network analysis techniques to provide a deeper understanding of how these concepts interrelate within X.

2. Method

A text network analysis method based on of topic modelling has been performed in order to analyze the Twitter representation of 'cohousing' along the period 2019-2022 (Budan & Graeme, 2006; Bullinaria & Levy, 2012). Retrieving the topics from text by identifying the clusters of co-occurrent words within them, based on the bag-of-words and skip-gram models (Jones & Mewhort, 2007; Bruni et al., 2014; Feng et al., 2017). For this purpose, we used the software 'InfraNodus' written in JavaScript (Node.js) implementing Sigma.js, Cytoscape and Graphology libraries in the front-end and java-based Neo4J graph database. This software uses graph theory instead of probability distribution to identify the related words and assign them into topical clusters. First, all the words in the text are converted into their lemmas to reduce redundancy; keeping the morphological root of each word. The words that function as liaisons and that do not carry any additional meaning are removed from the text. The text is then converted into a directed network graph. The normalized words (lemmas) are the nodes in the network graph and their co-occurrences are the edges. This

application of graph theory helps gain a better understanding of the textual discourse structure of the relationships between words and sentence in context.

Furthermore, the method of pairwise comparisons was implemented to focus on the summarization of shared or unshared topics among tweets (Campr & Jezek, 2013; Zhai et al., 2004). The comparison criterion is established according to the following formula:

$$(1) D_{l \in DC}^c$$

where index $l \in \{1 \dots |DC|\}$ we define DC by topics discovered using latent Dirichlet allocation or LDA (Blei et al., 2003) and a pairwise distance matrix. Finally, we calculated tf-idf of bigrams across the main clusters of topics in Twitter discussions.

3.1. Exploring Social Conversation: Twitter Scraping and Accessing Data on Networks

In this research, the Snsrape library was utilized, enabling the scraping of tweets through the Twitter API without limitations on the number and periods.

The web scraping of tweets containing the keywords 'cohousing', 'co-housing' and 'coliving', co-living in English, along with their respective hashtags (e.g., #cohousing) and related terms (e.g., co-housing), was carried out using a Python script within a Jupyter Notebook environment. The queries involved operators designed to match various specific tweet attributes. These operators were applied to different tweet features such as text, geographic location, language, user who posted it, and more. The Natural Language Toolkit (NLTK) library was also used, which provides tools and resources for natural language text processing and analysis (NLP).

The constructor of the 'TwitterSearchScraper' class takes the input string as a parameter and utilizes the `get_items()` method to retrieve all tweets that meet the established conditions. Subsequently, the information is processed, and a Pandas dataframe is generated.

Figure 1

Pandas DataFrame Generation

```
#DataFrame Generation
tweets_df = pd.DataFrame(list_tweets, columns=columns)
tweets_df.info()
```

91039 tweets in English were extracted between 2019 and 2022 for subsequent use of natural language processing (NLP) techniques. Collectively, the Twitter API, Python, and the Snsrape library enabled the collection of an extensive set of tweets. Additionally, the Natural Language Toolkit (NLTK) library is essential for data processing.

Next, the `preprocess_tweet(tweet)` function from the code represented in Figure 2, is shown. This function takes a tweet and performs preprocessing and transformation operations. Firstly, it removes URLs, RTs, and Twitter usernames. Then, it eliminates special characters and numbers, followed by additional white spaces. It subsequently tokenizes the tweet into individual words and removes common words and stopwords. Finally, it returns a unique string of words separated by a single space.

Figure 2

Code for Text Preprocessing for Twitter Analysis

```

if not tweet or str(tweet) == "nan":
    words = "nan"

tweet = tweet.strip()

# Delete URLs, RTs, and Twitter usernames
tweet = re.sub(r'^RT[\s]+', '', tweet)
tweet = re.sub(r'@[A-Za-z0-9]+', '', tweet)
tweet = re.sub(r'https?:\V.*?[\r\n]**', '', tweet)
tweet = re.sub(r',', '', tweet)

# Remove special characters and numerals.
tweet = re.sub(r'[a-zA-Z#]', '', tweet)

# Remove empty spaces.
tweet = re.sub(r'[a-zA-Z#]'. ' '. tweet).strip()

#Tokenization
words = tweet.split()

#Lowercasing
words = tweet.split()

#Alphanumeric normalization
words = [w.lower() for w in words]

#Stopword removal
stop_words = set(stopwords.words('english'))
words = [word for word in words if not word in stop_words and not word in ['a', 'for', 'an

return " ".join(words)

#Preprocessing of tweets
df['user_location_limpio'] = df['user_location_limpio'].apply(preprocess_tweet)

```

All tasks that interweave stages and techniques are fundamental for data systematization, enabling subsequent analysis. This contributes to simplification and clearly exposes which information is most relevant within the dataset. This, in turn, lays the groundwork for extracting key insights and trends in the realm of cohousing and coliving, ultimately enriching our understanding of these topics in the digital era.

3. Analysis and results

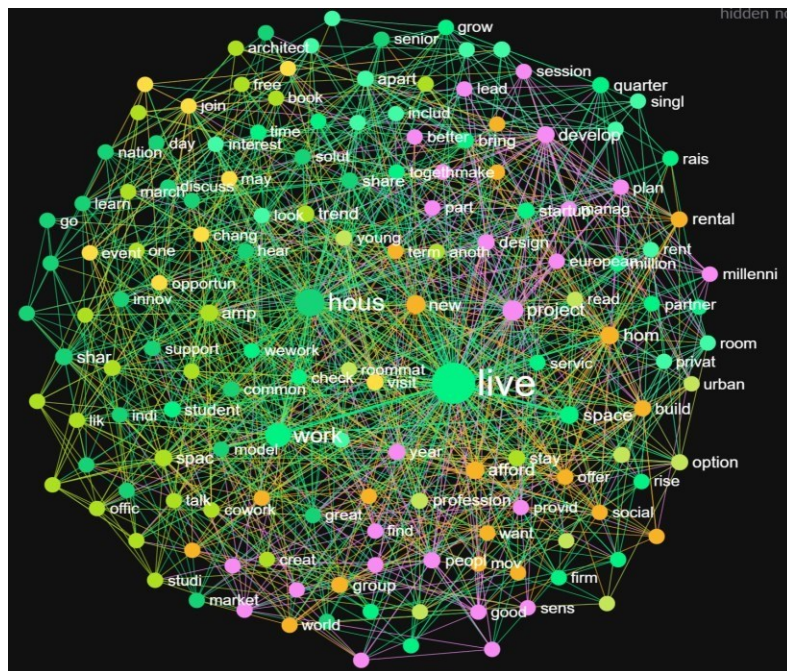
We have obtained a weighted network according to the application of the following formula (Newman, 2004).

$$Q = \frac{1}{2m} \sum_{i,j} \left[A_{ij} - \frac{k_i k_j}{2m} \right] \delta(c_i, c_j)$$

where A_{ij} represents the weight of the edge between i and j , $k_i = \sum_j A_{ij}$ is the sum of the weights of the edges attached to vertex i , c_i is the community to which vertex i is assigned, the δ function $\delta(u, v)$ is 1 if $u = v$ and 0 otherwise and $m = \frac{1}{2} \sum_{i,j} A_{ij}$.

Figure 3

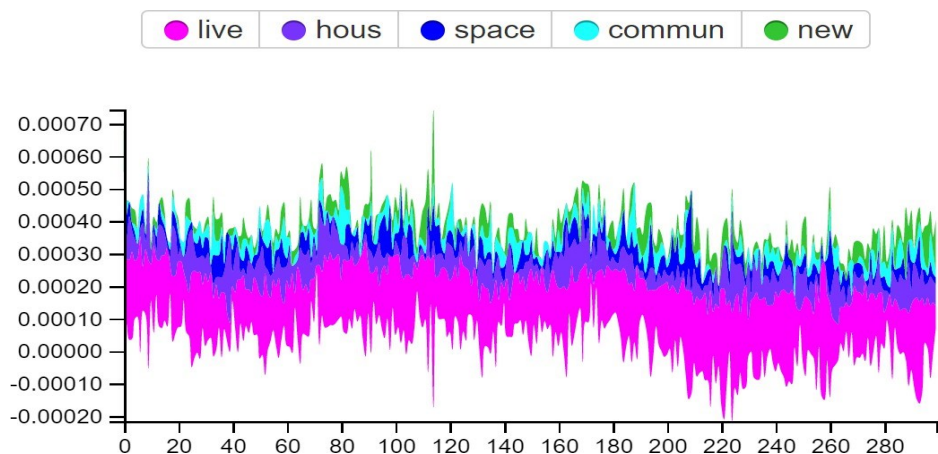
Cohousing graph from tweets 2019-2022



As the data is very clustered, we use the Jenks elbow cutoff algorithm (Jenks, 1967) to select the top prominent lemmas that have significantly higher influence than the rest (Figure 4). It can be observed that 5 concepts are recurrent throughout the different tweets analyzed.

Figure 4

Top prominet lemmas



The network structure result was 0.73 which indicates a high modularity measured with Louvain's community detection algorithm (Blondel et al., 2008). Table 1 shows the most

influential clusters in the data analyzed, together with Figure 5 in which their representation in the graph can be visualized.

Table 1

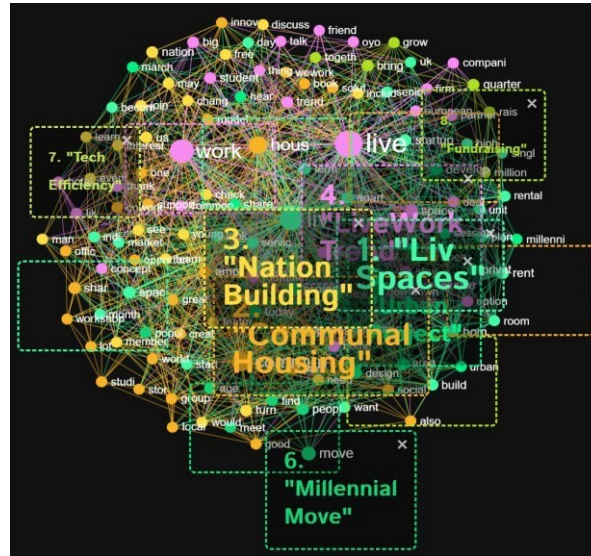
Mapping of degree of frequency, betweenness and diversity of main topics

Topic	Degree	Frequency	Betweenness	Topic	Conductivity	Locality	Diversity
sum total	651	421	2.611.411	n/a	4298.00	421	5229.00
sum / 8 nodes	5.20	3.88	0.126121	n/a	30.11	2.34	134.70
Live spaces	31	212	0.486531	67	289.0	0	256.1
Communal							
Housing	30	210	0.361294	62	278.5	0	228.9
Nation							
Building	28	199	0.378134	51	276.0	0	226.5
LiveWork							
Trend	24	156	0.323611	46	212.3	0	224.0
Urban							
Project	19	128	0.223967	44	188.7	0	176.5
Millennial							
Move	18	100	0.231278	42	178.9	0	127.5
Tech							
Efficiency	11	99	0.112378	38	165.2	0	99.5
Fundraising	10	87	0.094512	20	105.1	0	88.2

We use a combination of clustering and graph community detection algorithm based on Louvain (Blondel et al., 2008) to identify the groups of nodes are more densely connected together than with the rest of the network. They are aligned closer to each other on the graph using the ForceAtlas2 algorithm (Jacomy et al., 2014) and are given a distinct color. The most influential nodes are either the ones with the highest betweenness centrality (current setting) — appearing most often on the shortest path between any two randomly chosen nodes (linking the different distinct communities or the ones with the highest degree).

Figure 5

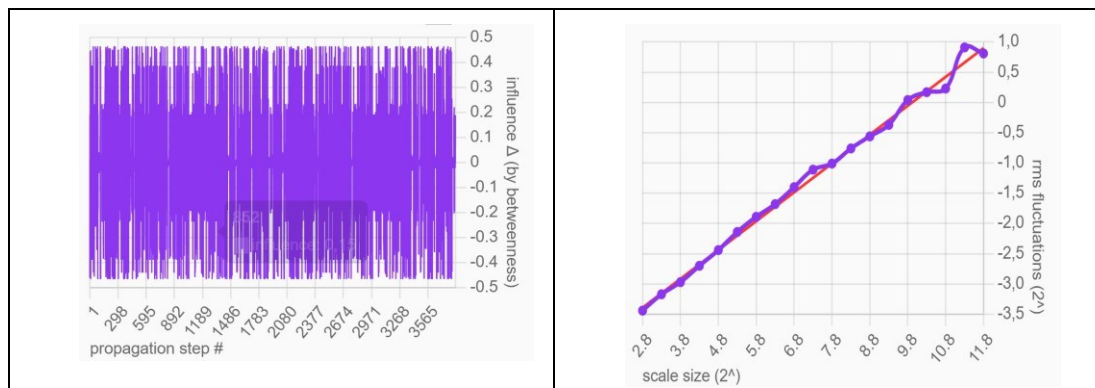
Main topics



Then, we plot the narrative as a time series of influence (using the words' betweenness score). We then apply detrended fluctuation analysis to identify fractality of this time series, plotting the \log^2 scales (x) to the \log^2 of accumulated fluctuations (y). The propagation dynamics is fractal variability with an alpha exponent: 0.94 (Hurst, 1951). A very high results based on Detrended Fluctuation Analysis of influence (Gneiting & Schlather, 2004). Then, the resulting loglog relation can be approximated on a linear polyfit because the nodes have preferential attachment (e.g. 20% of nodes tend to get 80% of connections), and we can postulate a power-law relation in how the influence propagates in this narrative, based on kolmogorov-smirnov test results: ks: 1.11, d: 0.46 <= cr: 0.55.

Figure 6

Propagation and fluctuation of main topics in tweets



As can be seen in the propagation and fluctuation results of the main topics associated with the tweets, the discourse's structure is focused and its immunity is low, which means it

may be easier to infiltrate. While it has several perspectives, it is focused on one. The higher is the network's structure diversity and the higher is the alpha in the influence propagation score, the higher is its mind-viral immunity — that is, such network will be more resilient and adaptive than a less diverse one. The network structure indicates the level of its diversity. It is based on the modularity measure (>0.4 for medium, >0.65 for high modularity / this network = 0.73), measured with Louvain (Blondel et al., 2008) community detection algorithm, in combination with the measure of influence distribution (the entropy of the top nodes' distribution among the top clusters), as well as the percentage of nodes in the top community.

Likewise, to complement the cluster information, we analyzed the bigrams associated with each of the clusters in order to go further into the relationships of main topics. To do this, we used the following notation.

```
bigram_tf_idf <- bigrams_united %>%
count(cluster, bigram) %>%
bind_tf_idf(bigram, cluster, n) %>%
arrange(desc(tf_idf))
```

We present, in Table 2, the 'td_idf' with the highest results of the seven most representative bigrams in each of the clusters in order to determine 'cohousing' impact in Twitter community.

Table 2

Data of clusters

Cluster	Bigram	n	tf	tf_idf
Coworking Spaces	commun-share	121	0.03984481	0.04249421
	cowork-local	93	0.03874412	0.02845211
	group-support	124	0.03784118	0.04241470
Rental Apartments	live-spaces	143	0.03712267	0.04129740
	afford-build	151	0.03984419	0.04249474
	rental-single	137	0.03047901	0.04124772
Professional Networking	young-profession	148	0.03240741	0.02087241
	change-city	115	0.02882472	0.04977412
	hotel-investor	133	0.02274289	0.04129861
Work-Live Spaces	option-demand	131	0.02574235	0.04139898
	market-deal	111	0.02174290	0.04139823
	live-work	99	0.02784253	0.04139856
Urban	project-develop	88	0.01704177	0.04139822

Planning	area-share	100	0.01274112	0.04139883
	option-demand	102	0.01674100	0.04139812
Population Movement	people-age	93	0.01974175	0.04139822
	move-meet	91	0.01374128	0.04139836
Fundraising Growth	people-find	88	0.01174129	0.04139821
	money-grow	83	0.01574124	0.04129889
	fund-demand	71	0.01474131	0.04129834
	raise-fund	69	0.01674154	0.04129831

In Table 2, we can observe that the first cluster 'Coworking Spaces' is divided in three bigrams: (1) 'commun-share' (tf_idf 0.04249421); (2) 'cowork-local' (tf_idf 0.02845211) and (3) 'group-support' (tf_idf 0.04241470). In this sense, shared communal housing could promote a supportive environment and bridges the gap between great living models, fostering a better world built on cooperation. Coworking spaces and cohousing provide modern solutions, allowing people to join forces in affordable living and working environments. The second cluster 'Rental Apartments' is divided in three bigrams: (1) 'live-spaces' (tf_idf 0.04129740); (2) 'afford-build' (tf_idf 0.04249474) and (3) rental-single' (tf_idf 0.04124772). In the current scenario new startups and companies are appearing and building affordable living spaces to revolutionize the rental market, making home options like apartments more accessible for everyone. Rental apartments and cohousing enable people to affordably join a community, share living spaces, and embrace an innovative model promoting connection among diverse individuals.

The third cluster 'Professional Networking' is divided in another three bigrams: (1) 'young-profession' (tf_idf 0.02087241); (2) 'change-city' (tf_idf 0.04977412) and (3) 'hotel-investor' (tf_idf 0.04129861). Professional networking in cohousing communities fosters collaboration, enabling residents from various fields to share ideas and expertise. This innovative living model provides affordable spaces that adapt to the evolving needs of students, professionals, and millennials working on different projects. The fourth cluster 'Work-Live Spaces' is divided in another three bigrams: (1) 'option-demand' (tf_idf 0.04139898); (2) 'market-deal' (tf_idf 0.04139823) and (3) 'live-work' (tf_idf 0.04139856). Work-live spaces and cohousing promote a sense of community by blending affordable living, professional development, and shared interests for diverse individuals including students and millennials. These innovative models foster collaboration in thriving environments, adapting to current trends and population needs. The fifth cluster 'Urban Planning' is divided in another three bigrams: (1) 'project-develop' (tf_idf 0.04139822); (2) 'area-share' (tf_idf 0.04139883) and (3) 'option-demand' (tf_idf 0.04139812). Urban planning and cohousing intersect as they both aim to create sustainable, affordable living spaces that foster a sense of community and shared resources. The sixth cluster 'Population Movement' is divided in another three bigrams: (1) 'people-age' (tf_idf 0.04139822); (2) 'move-meet' (tf_idf 0.04139836) and (3) 'people-find' (tf_idf 0.04139821). Cohousing communities and shared living spaces offer affordable housing options, attracting millennials and professionals who value collaboration. This trend influences population movement by promoting more integrated living in urban areas, fostering strong connections among diverse age groups and interests. The seventh cluster 'Fundraising Growth' is divided in another three bigrams: (1) 'money-grow' (tf_idf 0.04129889); (2) 'fund-demand' (tf_idf 0.04129834) and (3) 'raise-fund'

(tf_idf 0.04129831). Fundraising growth in cohousing communities can drive the development of shared, affordable living spaces designed for various age groups and professionals. As these projects gain traction, they enhance urban environments by fostering collaboration through communal housing that accommodates diverse interests and social connections.

3. Discusión

The research presented in this article offers valuable insights into the Twitter representation of cohousing and its related topics. By applying text network analysis techniques, we were able to uncover the underlying structure of the discourse, identifying distinct clusters of topics that resonate with diverse populations. Our findings emphasize the significance of communal living models and shared spaces, particularly in addressing challenges related to affordability and adaptation to global trends.

Incorporating communal living and shared spaces in housing models can make challenges, such as affordability and adaptation to global trends, more manageable for diverse populations, including students, professionals, and millennials. This innovative approach benefits both living conditions and societal growth while promoting a more connected community atmosphere. Among users, interest and discussion about 'Live Spaces' emerge, a term highly associated with innovation, design, and their advantages and disadvantages. This cluster is closer to cohousing than coliving due to the emphasis of the former on the permanent character of residence. In cohousing, the target population tends to participate in design, creating identity and a sense of belonging, thus fostering shared responsibility (Andersen & Lyhne, 2022). Tim Ingold (2000) argues that living spaces are not final products but rather processes in constant evolution, reflecting life phases and ongoing negotiations with space, embodying this notion in cohousing. Projects focus on interaction and gathering, aiming to meet housing needs. For example, the 'La Borda Cooperative', initiated in 2012 and completed in 2018, offers 28 affordable apartments and shared spaces such as a laundry room, kitchen, and flexible areas that transform into collaborative spaces (Molina & Valero, 2021). This example showcases the concept of living space, not only in the transformation of an abandoned space but also in the entire continuous and iterative process of construction and subsequent community collaboration.

Regarding 'Communal Housing', this node suggests an interest in the idea of sharing housing and resources. It can be related to both cohousing and coliving, as well as discussions about community living. It maintains a closer relationship with cohousing, especially with the 'Andel model' or user-ownership cooperatives, although coliving is not excluded. Crabtree-Hayes (2023) provides a terminological glossary, differentiating cohousing for its closer relation to mutual aid, communitarianism, and a greater project dimension, and coliving for sharing material resources and stimulating a certain capital of the new economy. In cohousing, community life is more formal, with planned collective decisions (From, 1991). In contrast, coliving is more informal, based on spontaneous interactions among residents. For example, a cohousing community in Belgium, transformed from the Herring Smoking Factory, has mandatory monthly contributions for collective improvements (De Vos & Spoormans, 2022). In some countries, residents contribute labor to reduce entry costs into cohousing.

Another important node is represented by 'Nation Building'; within this thematic scope, discussions at the national level about cohousing and coliving are inferred, likely related to government policies and/or national residential projects. There is a strong focus on the cohousing debate due to its connection to governmental policies and the provision of social housing. The United Nations' New Urban Agenda (2017) highlights the promotion of cohousing as a housing alternative. Similarly, the UN Committee on the Rights of Persons with Disabilities advocates for the right to live independently and be part of the community, opposing institutionalization (Committee on the Rights of Persons with Disabilities, 2017). Through cohousing, independence and community inclusion are fostered, allowing residents to make decisions and share responsibilities without imposing a rigid lifestyle. The Dinamo Foundation, located in Catalonia, promotes the development of cooperative housing. Their report, 'International Policies to Promote Cooperative Housing,' analyzes policies in Germany, Austria, Denmark, Italy, New York, among others, highlighting governmental measures such as land grants, subsidies, and access to credit (Baiges et al., 2019).

The cluster 'Fundraising' frames the debate around funding, which is one of the main barriers to constructing cohousing due to the high costs it faces. Additionally, this dimension is subject to significant ideological, legal, technical, and scientific discussion. The legal structure of states and these initiatives offers multiple options, mainly the Andel model or cooperatives for granting usage rights, which has generated the most interest among governments (Etxezarreta & Merina, 2014). This consideration becomes important due to the close relationship of these entities with the social economy and thus their financing methods. There isn't a single model, but they are characterized by mixed financing. Among the various strategies are: initial contributions from members, private savings, lease agreements, trusts, ethical banks, public funds, and community loans.

Furthermore, 'Rental Apartments and live-spaces' constitute another important debate. The intersection between demography, housing prices, and the labor market reflects the complexity of the rental market. Several factors drive interest in 'rental apartments,' some related to the evolution of the labor market, the rise of the knowledge economy, and others merely economic, such as real estate inflation in major cities. Moreover, new players have entered, such as investment funds, real estate companies, and others, solely aiming to purchase housing for rental purposes, termed as 'build to rent' (Nethercote, 2019). The bigrams 'live-spaces,' 'afford-build rental,' and 'rental single' share thematic debate in the search for living spaces. In this context, it is essential to consider adding value to these housing options by reducing costs, generating environmental and economic sustainability, and catering to smaller family sizes. Among the objectives of cohousing, there may be the aim to offer housing below market prices and limit speculation through cooperativism and the transfer-of-use regime.

In this sense, in today's job landscape, 'Professional Networking' is a crucial topic for success in various sectors, providing opportunities for collaboration and job-seeking, particularly for 'Young-Profession' in their early steps (Bouncken, 2018). The bigram 'change-city' alludes to labor mobility, vital for work flexibility. The fusion between work and tourism in colivings with coworking blurs the lines between both spheres, connecting with the concept of the 'hotel-investor.' Chevtaeva (2021) mentions that definitions of coworking and coliving spaces can differ, ranging from hotels and laboratories to playful work environments. These elements highlight the increasing integration between work, travel, and community living, generating a more versatile and enriching work lifestyle. This trend, particularly evident in colivings, blends work productivity with cultural experiences, leading

to more flexible modes of employment. Consider that the Knowledge and Communication Society is a relatively recent phenomenon, having emerged within the past few decades, and is therefore in a state of continuous transformation (Concepción et al., 2022).

For this development, 'Urban Planning' is crucial to effectively integrate cohousing and coliving in urban areas. Elements of interest include urban design and infrastructure, ensuring compliance with zoning and development requirements, particularly in cohousing where land reservation is linked to cost reduction (Baiges et al., 2019). These practices are essential in urban planning due to their association with the Sustainable Development Goals. The 'project-develop' is complex, facing challenges in funding, bureaucracy, and extended timelines, especially in civil society-driven cohousing projects. SDG 11 addresses urban sustainability, focusing on housing and economic impact (United Nations, 2015). Urban planning is critical to integrating these residential models into existing urban environments, ensuring compliance with legal regulations and environmental sustainability. Housing demands evolve with 'option demand' according to civil society preferences.

In the context of cohousing and coliving, 'Population Movement' reflects people's interest in seeking new ways of living in communities, whether by age, in intergenerational groups, or based on similar interests. Wang et al. (2020), in their study on the motivations of British cohousing members, reflect that the main motivation to join a project is its social aspect: being part of a community, sharing, living intergenerationally, and cohabitating with like-minded individuals. Environmental sustainability and financial concerns related to capital possession are also highlighted. The 'people-ageing' is a significant factor in the interest of cohousing for older individuals. As the population ages, people seek alternatives that enable them to age in their own homes while staying in touch with the community, receiving social support, and sharing services. There is concern that cities generate trends that do not promote health and well-being for older individuals (World Health Organization, 2023). Koller et al. (2023) studied the pandemic's impact on cohousing communities, and their findings indicated that resilience and social well-being can improve by living in cohousing. Regarding 'move-meet,' as previously mentioned among the purposes of cohousing members, it is living with individuals who share similar values; in fact, it has an intentional character. Schetsche et al. (2021) investigated if there were personality traits and/or emotional intelligence from a psychological perspective among people living in cohousing. They demonstrated that residents of cohousing communities have higher levels of well-being and fewer maladaptive personality traits; however, further study of these characteristics is needed. The way people connect with cohousing communities or search for coliving accommodation 'people-find' currently shares a meeting place: specialized websites in the respective field. The Cohousing Association of the United States on their website, <https://www.cohousing.org/>, provides a directory of projects in different states for association or participation. Likewise, <https://coliving.com/es/> allows you to find coliving accommodation.

5. Conclusions

The emergence of communal living and shared spaces have become great models for creating a better and liveable world. This trend is especially seen amongst students, startups, and young professionals, who are looking to rent out affordable new apartments, homes, and live/work spaces. As a result, this is an ever-growing movement that is turning our nation into a much more livable and communal environment, where people of all interests can join

and live their lives. The trend of communal living is on the rise, with more and more people turning to the US profession-like model of shared housing and living spaces to rent, like homestays and new apartments, which are more affordable than ever. This great model of communal living provides a good world for those who join the interest in staying, living, and working together, allowing students and startups to benefit from the big space. Turning a shared workspace into a startup hub can benefit professionals in various fields, renting space for work and fostering collaboration in designated areas. The presence of recurring themes such as coworking spaces, rental apartments, and professional networking underscores the broad and diverse scope of the cohousing conversation on Twitter. This diversity suggests that communal living and shared spaces have a multifaceted impact on society, benefiting both living conditions and societal growth. Furthermore, our analysis of influence propagation using a fractal pattern highlights the predictability of influence spread within the Twitter network, with certain nodes exerting disproportionately high influence.

In conclusion, the emergence of communal living and shared spaces represents a promising model for fostering a more connected and liveable world. This trend is particularly prominent among students, startups, and young professionals, who are increasingly seeking affordable and collaborative living arrangements. Additionally, our analysis points to potential areas for further research, including the impact of rising housing prices, changes in labor relations, community theories, the role of social capital, critiques related to gentrification, and the concept of liquidity as proposed by Zygmunt Bauman. Exploring these dimensions can provide a deeper understanding of the evolving landscape of communal living and shared spaces in contemporary society. Understanding the prominence of themes such as coworking spaces and rental apartments in cohousing discourse can inform the development of more inclusive and collaborative living environments.

This research provides valuable insights into the intricate landscape of cohousing discourse and underscores the significance of communal living models in addressing contemporary societal challenges with a focus on technical and analytical rigor. Overall, these forms of housing are expected to continue growing in popularity in the future, especially as more people seek ways to live more sustainably and communally.

Authors' Contributions

Conceptualización, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.; curación de datos, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.; análisis formal, R. S.-R., E. V.-C., N.; adquisición de financiación, R. S.-R., E. V.-C. y E.L.-M.; investigación, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.; metodología, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.; administración de proyectos, E. V.-C., N. D.-D. y E.L.-M.; Recursos, R. S.-R., E. V.-C. y N. D.-D.; software, E. V.-C. y N. D.-D.; supervisión, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.; validación, E. V.-C., N. D.-D. y E.L.-M.; visualización, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.; escritura: preparación del borrador original, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.; redacción: revisión y edición, R. S.-R., E. V.-C., N. D.-D. y E.L.-M.

References

- Andersen, M. A., & Lyhne, M. B. (2022a). Co-creating Danish cohousing. *Architectural Research Quarterly*, 26(2), 197–208. <https://doi.org/10.1017/S1359135522000355>
- Baiges, C., Ferreri, M., & Vidal, L. (2019). *International policies to promote cooperative housing*. <https://bit.ly/3SuTkeY>.
- Blei, D. M., and M. I. J., Andrew, N. N., & Michael, I. J. (2003). Latent Dirichlet Allocation. *Journal of Machine Learning Research*, 3(4–5), 993–1022.

- Blondel, V. D., Guillaume, J. L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of Statistical Mechanics: Theory and Experiment*, 10, P10008.
- Bouncken, R. (2018). University coworking-spaces: mechanisms, examples, and suggestions for entrepreneurial universities. *Int. J. Technology Management*, 77, 38–56.
- Bruni, E., Tran, N. K., & Baroni, M. (2014). Multimodal Distributional Semantics. *Journal of Artificial Intelligence Research*, 49, 1–47. <https://doi.org/10.1613/jair.4135>
- Budanitsky, A., & Hirst, G. (2006). Evaluating WordNet-based Measures of Lexical Semantic Relatedness. *Computational Linguistics*, 32(1), 13–47. <https://doi.org/10.1162/coli.2006.32.1.13>
- Bullinaria, J. A., & Levy, J. P. (2012). Extracting semantic representations from word co-occurrence statistics: stop-lists, stemming, and SVD. *Behavior Research Methods*, 44(3), 890–907. <https://doi.org/10.3758/s13428-011-0183-8>
- Camp, M., & Karel, J. (2013). Text, Speech, and Dialogue. *Lecture Notes in Computer Science*, 8082, 568–574.
- Chevtavaeva, E. (2021). Coworking and Coliving: The Attraction for Digital Nomad Tourists. In W. Wörndl, J. L. Stienmetz, & C. Koo (Eds.), *Information and Communication Technologies in Tourism 2021* (pp. 202–209). Springer International Publishing. https://doi.org/10.1007/978-3-030-65785-7_17
- Chou, K.-L., Liang, K., & Sareen, J. (2011). La asociación entre el aislamiento social y los trastornos del estado de ánimo, la ansiedad y el uso de sustancias del DSM-IV : segunda ola de la Encuesta epidemiológica nacional sobre el alcohol y afecciones relacionadas. *The Journal of Clinical Psychiatry*, 72(11), 1468–1476. <https://doi.org/10.4088/JCP.10m06019gry>
- CohoUS. Cohousing Association of the United States. Accessed 14 November 2022. <https://bit.ly/48YLIMs>.
- Comité sobre los Derechos de las Personas con Discapacidad. (2017). Observación general núm. 5 (2017) sobre el derecho a vivir de forma independiente y a ser incluido en la comunidad CRPD/C/GC/5. Accessed 14 November. 2022 <https://bit.ly/48YLAqQ>.
- Concepción, J. D., López Meneses, E., Vázquez Cano, E., & Crespo-Ramos, S. (2022). Implication of previous training and personal and academic habits of use of the Internet in the development of different blocks of basic digital 2.0 competencies in university students. *IJERI: International Journal of Educational Research and Innovation*, 18, 18–46. <https://doi.org/10.46661/ijeri.6337>.
- Coliving.com. Coliving es mejor Encuentre casas coliving flexibles, cómodas y asequibles con amigos incluidos. Accessed 14 November. 2022 <https://bit.ly/48Z2K7l>.
- Crabtree-Hayes, L. (2023). Establishing a glossary of community-led housing. *International Journal of Housing Policy*, 1–28. <https://doi.org/10.1080/19491247.2022.2155339>
- Crowe, C. L., Domingue, B. W., Graf, G. H., Keyes, K. M., Kwon, D., & Belsky, D. W. (2021). Associations of Loneliness and Social Isolation With Health Span and Life Span in the U.S. Health and Retirement Study. *The Journals of Gerontology: Series A*, 76(11), 1997–2006. <https://doi.org/10.1093/gerona/glab128>

- De Molina Benavides, L., & Valero Ramos, E. (2021a). La vivienda colaborativa en la era digital como proceso sostenible. *Dearq*, 31, 21–31. <https://doi.org/10.18389/dearq31.2021.03>
- De Vos, E., & Spoormans, L. (2022). Collective Housing in Belgium and the Netherlands: A Comparative Analysis. *Urban Planning*, 7(1), 336–348. <https://doi.org/10.17645/up.v7i1.4750>
- Etxezarreta, A., & Merino, S. (2014). Las cooperativas de vivienda como alternativa al problema de la vivienda en la actual crisis económica. *REVESCO. Revista de Estudios Cooperativos*, 113(0), 92–119. https://doi.org/10.5209/rev_REVE.2014.v113.43382
- Eurostat. (2022). Evolución de los precios de la vivienda y los alquileres. Accessed 14 November. 2022 <https://bit.ly/495Qa6N>
- Feng, Y., Bagheri, E., Ensan, F., & Jovanovic, J. (2017). The state of the art in semantic relatedness: a framework for comparison. *The Knowledge Engineering Review*, 32, e10. <https://doi.org/10.1017/S0269888917000029>
- Fromm, D. (1991). *Collaborative Communities: Cohousing, Central Living, and Other New Forms of Housing with Shared Facilities* (Van Nostrand Reinhold, Ed.; 1st ed.). Van Nostrand Reinhold.
- Gneiting, T., & Schlather, M. (2004). Stochastic Models That Separate Fractal Dimension and the Hurst Effect. *SIAM Review*, 46(2), 269–282. <https://doi.org/10.1137/S0036144501394387>
- Gobierno Vasco. (2020). Diagnóstico del modelo cohousing en Euskadi. Accessed 14 November. 2022. <https://bit.ly/48K45jc>.
- Guity Zapata, N. A., & Stone, W. M. (2022). Home motivations and lived experiences in housing cooperatives and cohousing communities: a two-contexts scoping review. *Housing Studies*, 1–24. <https://doi.org/10.1080/02673037.2022.2157801>
- Gummà, E., & Castilla, M. R. (2017). Cohousing de personas mayores. Un recurso residencial emergente. *Documentos de Trabajo Social*, 59, 52–54.
- Harris, R. G. (2001). The knowledge-based economy: intellectual origins and new economic perspectives. *International Journal of Management Reviews*, 3(1), 21–40. <https://doi.org/10.1111/1468-2370.00052>
- Hassan Shah, S. H., Noor, S., Saleem Butt, A., & Halepoto, H. (2021). Twitter Research Synthesis for Health Promotion: A Bibliometric Analysis. *Iranian Journal of Public Health*, 50(11), 2283–2291. <https://doi.org/10.18502/ijph.v50i11.7584>
- Heinrich, L. M., & Gullone, E. (2006). The clinical significance of loneliness: A literature review. *Clinical Psychology Review*, 26(6), 695–718. <https://doi.org/10.1016/j.cpr.2006.04.002>
- Horelli, L., & Vepsä, K. (1994). In Search of Supportive Structures for Everyday Life. In *Women and the Environment* (Vol. 13, pp. 201–226). Springer US. https://doi.org/10.1007/978-1-4899-1504-7_8
- Hou, S.-I., & Cao, X. (2021). Promising Aging in Community Models in the U.S.: Village, Naturally Occurring Retirement Community (NORC), Cohousing, and University-Based Retirement Community (UBRC). *Gerontology and Geriatric Medicine*, 7, 1–15. <https://doi.org/10.1177/23337214211015451>
- Hsu, A. T., Lane, N., Sinha, S., Dunning, J., Dhuper, M., Kahiel, Z., & Sveistrup, H. (2020). *Impact of COVID-19 on residents of Canada's long-term care homes – ongoing challenges and policy responses*. Nternational Long-Term Care Policy Network. <https://bit.ly/423tm5n>

- Hurst, H. E. (1951). Long-Term Storage Capacity of Reservoirs. *Transactions of the American Society of Civil Engineers*, 116(1), 770–799. <https://doi.org/10.1061/TACEAT.0006518>
- Ingold, T. (2000). *The Perception of the Environment: Essays on livelihood, dwelling and skill: Vol. First Edition (Routledge, Ed.; 1st ed.)*. Routledge.
- International Monetary Found. (2022). Global Housing Watch. Accessed 14 November 2023. <https://bit.ly/3S3BfDf>.
- Jakonen, M., Kivinen, N., Salovaara, P., & Hirkman, P. (2017). Towards an Economy of Encounters? A critical study of affectual assemblages in coworking. *Scandinavian Journal of Management*, 33(4), 235–242. <https://doi.org/10.1016/j.scaman.2017.10.003>
- Jenks, G. F. (1967). The Data Model Concept in Statistical Mapping. *International Yearbook of Cartography*, 7, 186–190.
- JLL. (2019). European Coliving Index. Accessed 14 November 2023. <https://bit.ly/3Hu1pKg>.
- Jones, M. N., & Mewhort, D. J. K. (2007). Representing word meaning and order information in a composite holographic lexicon. *Psychological Review*, 114(1), 1–37. <https://doi.org/10.1037/0033-295X.114.1.1>
- Koller, J. M., Hutchings, B. L., & Zobotka, J. (2023). Older Adult Residents in Cohousing Communities: Impact and Response to the COVID-19 Pandemic, Part 2 (P2) Follow-Up Study. *Journal of Aging and Environment*, 1–19. <https://doi.org/10.1080/26892618.2022.2161031>
- Kraaijeveld, O., & De Smedt, J. (2020). The predictive power of public Twitter sentiment for forecasting cryptocurrency prices. *Journal of International Financial Markets, Institutions and Money*, 65, 101188. <https://doi.org/10.1016/j.intfin.2020.101188>
- Lilac. *Living Affordable Community*. Accessed 14 November. 2022. <https://bit.ly/3O6O3Hx>.
- Mahmood, A., Seetharaman, K., Jenkins, H.-T., & Chaudhury, H. (2022). Contextualizing Innovative Housing Models and Services Within the Age-Friendly Communities Framework. *The Gerontologist*, 62(1), 66–74. <https://doi.org/10.1093/geront/gnab115>
- Makimoto, T., & Manners, D. (1997). *Nómada digital* (John Wiley & Sons, Ed.; 1st ed.). John Wiley & Sons.
- Meltzer, G. (2001). *Co-Housing Bringing Communalism to the World? International Communal Studies Association, Communal Living on the Threshold of a New Millennium: Lessons and Perspectives, Proceedings of the 7th International Communal Studies Conference*.
- Naciones Unidas. (2017). *Nueva Agenda Urbana A/RES/71/256* (Secretaría de Habitat, Ed.). Naciones Unidas.
- Naciones Unidas. (2023). *Leaving no one behind in an ageing world* (Naciones Unidas). Accessed 14 November. 2023. <https://bit.ly/4943F74>
- Nash, C., Jarrahi, M. H., Sutherland, W., & Phillips, G. (2018). Digital Nomads Beyond the Buzzword: Defining Digital Nomadic Work and Use of Digital Technologies. In C. Springer (Ed.), *Transforming Digital Worlds. iConference 2018. Apuntes de conferencias sobre informática* (pp. 207–217). https://doi.org/10.1007/978-3-319-78105-1_25
- Natural Language Toolkit. *Natural Language Toolkit*. Accessed 14 November. 2023. <https://bit.ly/3SpYqJ4/>.

- Nethercote, M. (2020). Build-to-Rent and the financialization of rental housing: future research directions. *Housing Studies*, 35(5), 839–874. <https://doi.org/10.1080/02673037.2019.1636938>
- Newman, M. E. J. (2004). Analysis of weighted networks. *Physical Review E*, 70(5), 1–9. <https://doi.org/10.1103/PhysRevE.70.056131>
- ONU. (2015). *Resolución aprobada por la Asamblea General el 25 de septiembre de 2015. Transformar nuestro mundo: la Agenda 2030 para el Desarrollo Sostenible*. Accessed 14 November. 2023. <https://bit.ly/3Hq5vmC>
- Python. *Welcome to Python*. Accessed 14 November. 2023. <https://bit.ly/3SqHpi3>
- ¿Qué es un coliving? Accessed 14 November. 2022. <https://bit.ly/3S5MRpg>
- Rufai, S. R., & Bunce, C. (2020). World leaders' usage of Twitter in response to the COVID-19 pandemic: a content analysis. *Journal of Public Health*, 42(3), 510–516. <https://doi.org/10.1093/pubmed/fdaa049>
- Salas Rueda, R. A. (2023). Use of deep learning to analyze Facebook and Google classroom in the educational field. *Pixel-Bit. Revista de Medios y Educación*, 67, 87-122. <https://doi.org/10.12795/pixelbit.96994>
- Schetsche, C., Jaume, L., Gago-Galvagno, L., & Elgier, A. (2021). Living in cohousing communities. Personality Traits and Trait Emotional Intelligence. *European Journal of Mental Health*, 16, 170–183.
- Sinnenberg, L., Buttenheim, A. M., Padrez, K., Mancheno, C., Ungar, L., & Merchant, R. M. (2017). Twitter as a Tool for Health Research: A Systematic Review. *American Journal of Public Health*, 107(1), 1–8. <https://doi.org/10.2105/AJPH.2016.303512>
- Snsrape. Accessed 14 November. 2023. <https://bit.ly/3OdXKUN>.
- Spinuzzi, C. (2012). Working Alone Together. *Journal of Business and Technical Communication*, 26(4), 399–441. <https://doi.org/10.1177/1050651912444070>
- Swanson, K., Ravi, A., Saleh, S., Weia, B., Pleasants, E., & Arvisais-Anhalt, S. (2023). Effect of Recent Abortion Legislation on Twitter User Engagement, Sentiment, and Expressions of Trust in Clinicians and Privacy of Health Information: Content Analysis. *Journal of Medical Internet Research*, 25, 1–14. <https://doi.org/10.2196/46655>
- Tejada-Vera, B., & Kramarow, E. (2022). OVID-19 Mortality in Adults Aged 65 and Over: United States, 2020. *NCHS Data Brief*, 446, 4–4.
- Twitter. *Como twittear*. Accessed 14 November. 2023. <https://bit.ly/4aZp6ld>.
- Vogl, T., & Micek, G. (2023). Work-leisure concepts and tourism: studying the relationship between hybrid coworking spaces and the accommodation industry in peripheral areas of Germany. *World Leisure Journal*, 65(2), 276–298. <https://doi.org/10.1080/16078055.2023.2208081>
- Wang, J., Hadjiri, K., Bennett, S., & Morris, D. (2020). The role of cohousing in social communication and sustainable living environments. *WIT Transactions on The Built Environment*, 193, 2–3.

- Waters-Lynch, J. M., Potts, J., Butcher, T., Dodson, J., & Hurley, J. (2016). Coworking: A Transdisciplinary Overview. *SSRN Electronic Journal*, 1–58. <https://doi.org/10.2139/ssrn.2712217>
- Weeks, L. E., Bigonnesse, C., Rupasinghe, V., Haché-Chiasson, A., Dupuis-Blanchard, S., Harman, K., McInnis-Perry, G., Paris, M., Puplampu, V., & Critchlow, M. (2022). The Best Place to Be? Experiences of Older Adults Living in Canadian Cohousing Communities During the COVID-19 Pandemic. *Journal of Aging and Environment*, 1–3. <https://doi.org/10.1080/26892618.2022.2106528>
- World Health Organization. (2023). *National programmes for age-friendly cities and communities A guide* (World Health Organization, Ed.). World Health Organization.
- Zhai, C., Velivelli, A., & Yu, B. (2004). A cross-collection mixture model for comparative text mining. *Proceedings of the Tenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, 743–748. <https://doi.org/10.1145/1014052.1014150>