# KHIPU

## Strengthening Artificial Intelligence in Latin America
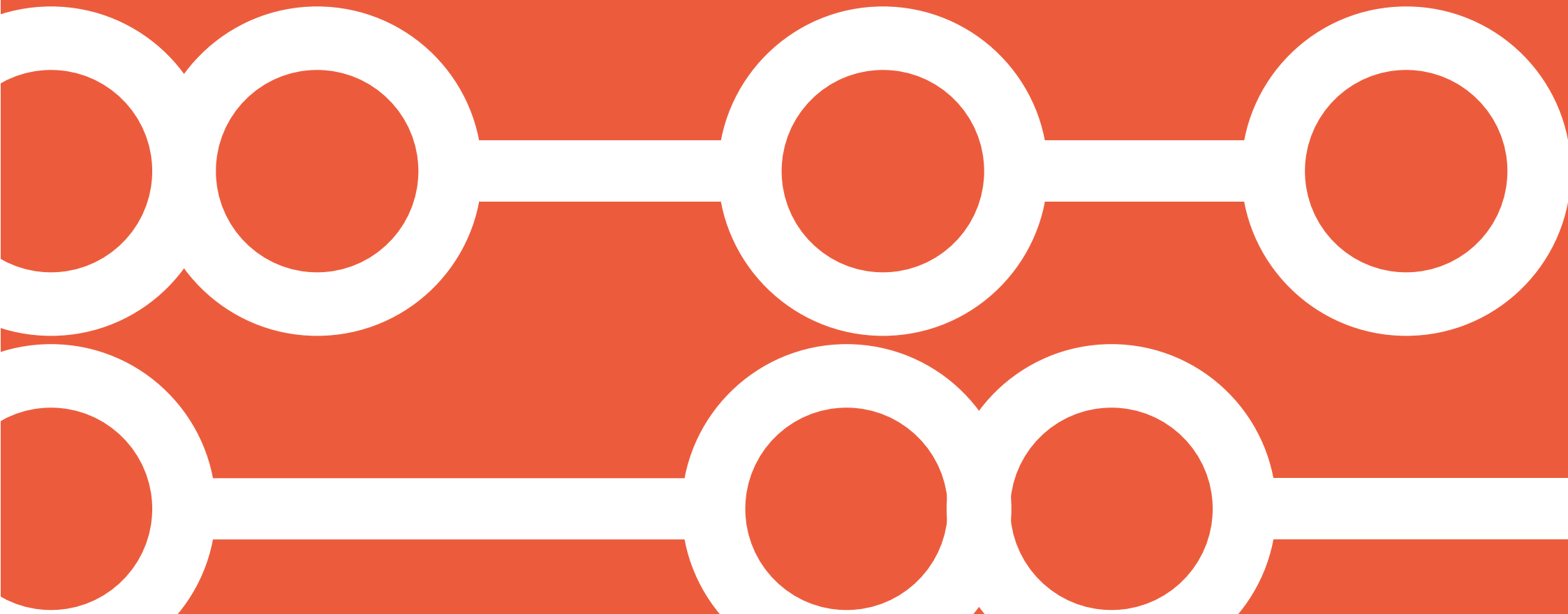
Outcomes of the First Khipu
Latin American Meeting
in Artificial Intelligence

# Index

# Introduction

# Introduction

The first ever edition of Khipu took place 11th - 15th November 2019 at the Universidad de la República in Montevideo, Uruguay. The mission of Khipu is to support the advancement of Latin American talent, research, and companies in Artificial Intelligence (AI).

Over five days students, professors, entrepreneurs, researchers, and industry practitioners from across Latin America who work in AI gathered together to exchange ideas, present their research, and participate in advanced technical training sessions. In spite of high travel costs[1] within the region, Khipu 2019 participants represented 13 Latin American countries. This was in large part thanks to our sponsors, whose support allowed us to grant 100% of the travel scholarships requested by accepted applicant students, and free registration to all students, academics, and members of non-profit organizations.

This diverse group of Latin Americans was joined by outstanding researchers from across the globe, most of whom traveled far distances to participate in Khipu. Khipu 2019 was lucky to count among its speakers individuals such as Chief of AI at Google Jeff Dean, IBM Brazil's lead natural resources researcher Bianca Zadrozny, and Turing Award winner Yoshua Bengio.

The importance of AI is becoming increasingly apparent from the highly visible discussions around AI and its applications on mainstream media platforms.[2] This technological explosion is in part due to the phenomenon known as Moore's Law, which estimates that the number of transistors on a microchip doubles every two years, though the cost of computers is halved. We are at a time of a computational revolution with more powerful, yet cheaper compute power than ever before. As a plethora of technologies such as smaller, more powerful devices and smartphones continues to become cheaper to manufacture, and access to the internet continues to spread around the globe, researchers are gaining access to more digital data than at any other point in history. With this combination of factors has come the increasing awareness of the potential opportunities and challenges of this emerging technology. The opportunities are vast and we're only just beginning to discover what is possible.

We, the organisers of Khipu, believe it is critically important that Latin Americans participate in this AI revolution, becoming active protagonists in developing these life-changing technologies. This report will delve deeper into some of the beliefs that led us to organise Khipu, and several early outcomes already observed following the event. In Section 1 we discuss why we believe strengthening the AI ecosystem in Latin America is important both for the prosperity of the region and for accelerating progress in the global field of AI. Section 2 looks at the current state of AI in Latin America. Following that, Section 3 puts forward the concrete aims for Khipu 2019 and how this would achieve the objective of strengthening the AI ecosystem in Latin America. Section 4 covers Khipu as it actually happened, including its impact, which is already evident across the Latin American AI community. Finally sections 6 and 7 respectively cover details on how we ensured diversity within the event and how we financed Khipu 2019.

# Motivations for Strengthening AI in Latin America
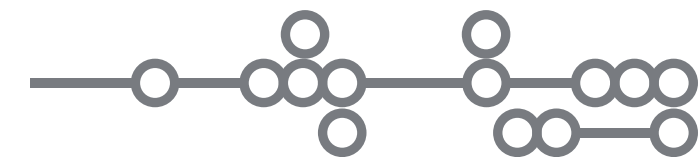
# Motivations for Strengthening AI in Latin America

Broadly, our motivations for working to strengthen AI in Latin America can be understood by answering two questions: (1) Why is it important for Latin America to invest in AI? and (2) Why is it important for the international AI community to engage with and invest in Latin America's AI ecosystem?

**Why should Latin America invest in AI?**

Local problems are often best solved by home-grown solutions. The closer you are to a problem, the more motivated you usually are to solve it and the greater the access to local domain experts who also understand, experience and live with such problems. Investment in the Latin American AI ecosystem means investment in problems specific to the region with better knowledge of the cultural and geographical context. This would also encourage more meaningful collaborations outside of a particular geographical context to identify AI solutions. It is therefore important to strengthen Latin American talent in AI and foster collaborations to understand problems where AI can bring about technological disruption to unlock a new wave of advancement in multiple sectors of society such as financial services, government, infrastructure frameworks and healthcare within the wider Latin American community.

AI excels at delivering value when the problem space is too complex for a human to process effectively in a reasonable amount of time. Latin America has already undergone decades of urbanization[3], and many of its largest cities are so populous that they have begun suffering from traffic gridlock, housing shortages, and other diseconomies of scale[4]. AI could be a critical tool in helping Latin America overcome its greatest macro economic challenge in the coming years: boosting worker productivity. Over the last 15 years in Latin America, 80% of GDP growth came from an increase in the labor force, while worker productivity faltered. However, in the same period, the fertility rate declined from 2.6 births per woman to 2.1. Now, these flattening demographics mean Latin America must find a way to bolster its worker productivity, or its economic and societal progress will stall. Artificial Intelligence promises to be the strongest tool for boosting worker productivity of our time.[6]

**Why should the international AI community invest in and engage with Latin America?**

There are several motivations for the international AI community to invest in the Latin American AI ecosystem. Firstly, the shortage of talent is arguably the single greatest factor limiting progress in AI today. In contrast, Latin America has a high availability of talent with the necessary skills to go into the field[7]. Bringing more Latin Americans into the field would also improve the current lacklustre diversity[8] in AI. Diverse teams are better equipped to solve challenging problems, since they are able to draw on the many different approaches team members put forward. In contrast, lack of diversity can have a debilitating effect through the creation of non-inclusive silos in the global AI ecosystem. Therefore, by engaging with and investing in the Latin American AI ecosystem, the international AI community stands to gain through building stronger collaborations and a more unified and enriched research community.
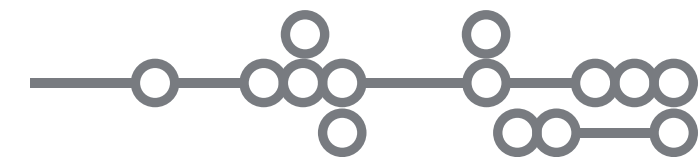
# Motivations for Strengthening AI in Latin America

**The Current State of AI in Latin America**

**Latin America needs more and better AI research output**

Doing research in Latin America is a challenge. Firstly, there is the challenge of underinvestment in research. Latin American countries spend below average in Research & Development. While all other countries on average spend 2.3% of their GDP in R&D, Latin America spends on average average only 0.7% of their GDP[9].

Latin America's contributions towards the development of AI are currently very limited. See for example Figure 1, based on data from The AI Index Report[10]. While Latin America holds 12% of the world's population and is responsible for 7% of the world's GDP, it is responsible for only roughly 3% of the publications in peer-reviewed media, which capture only about 2% of the citations produced by these media. This is also reflected in the number of patents registered for AI technology. While North America holds the highest share of new registered patents in the field (46%), Latin America holds 0.06% of the patents registered since 1990.
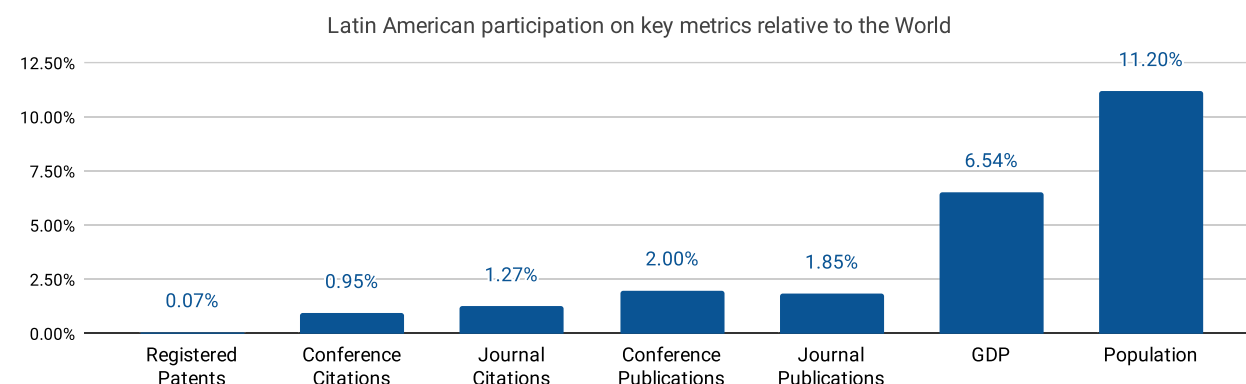


Figure 1: Mindshare of Latin America as a proportion of the global share[11].

**Artificial Intelligence research affects economic development**

A recent report by Accenture and Frontier Economics[11] analyzes the potential impact of AI for the five largest economies in South America. The findings reveal clear opportunities for value creation and economic growth. According to their modeling, AI has the potential to increase up to one percent the annual economic growth rates of these countries. Moreover, AI could significantly reduce the number of years needed for each national economy to double in size.
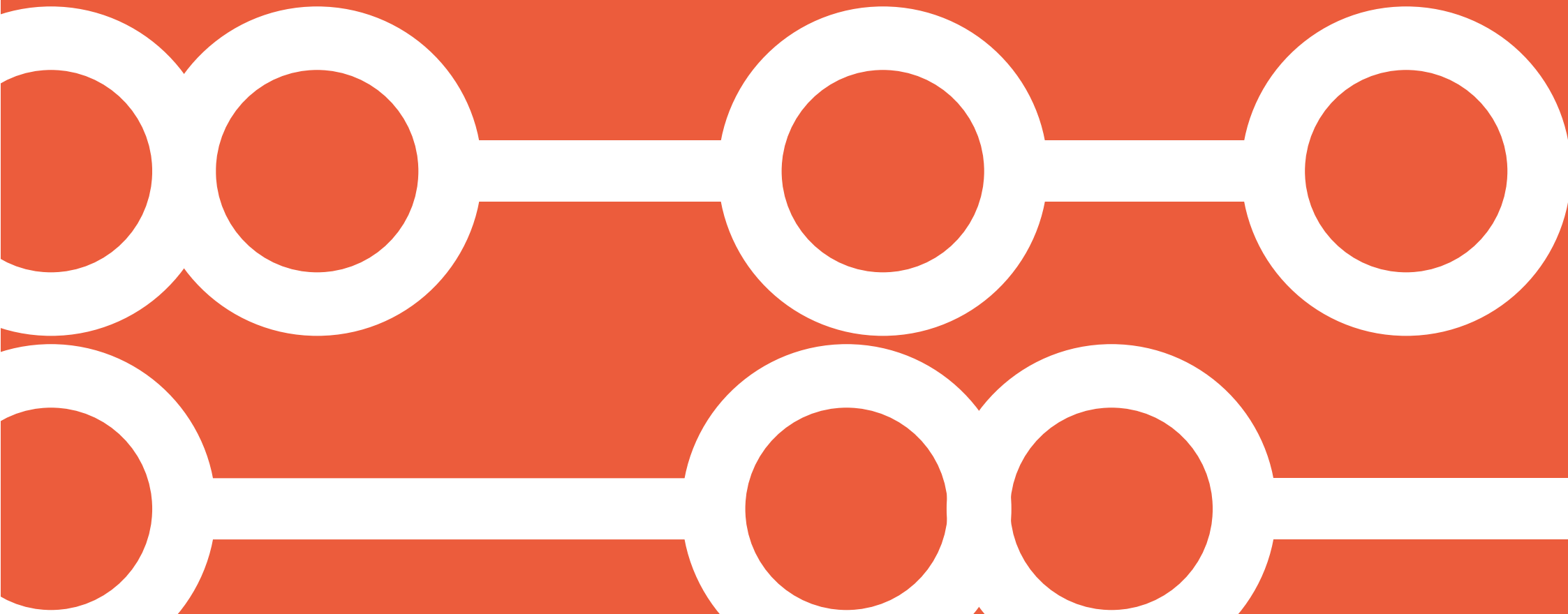
Latin America is also behind in terms of private investment in AI. The total (including startups) per capita private investment in AI in leading countries is significantly higher than in Latin American ones[12]. Israel, which leads the world ranking, has a total private investment in AI of 150 USD per capita. The United States, Canada and France, who are among the major players in AI, have investments greater than 10 USD per capita. In Latin America, Chile and Uruguay, the countries with largest private investment in AI is about 1.5 USD per person. The largest Latin American economies (Brazil, Argentina, Mexico) have investments of less than 0.25 USD per person.

The report also identifies a series of challenges in capitalizing on the AI wave. The most notorious challenge was linked to improving the quality of scientific research institutions and strengthening education systems so that more young adults access tertiary education.

**Latin American governments need to to welcome AI**

The Government Artificial Intelligence Readiness 2019 (Oxford Insights), shows that only two Latin American countries (Mexico and Uruguay) have developed, or are developing, national AI policies and strategies. This presents an important challenge for policymakers and society in general, who should act to ensure that the existent inequalities are not further aggravated by AI.

# Aims of Khipu

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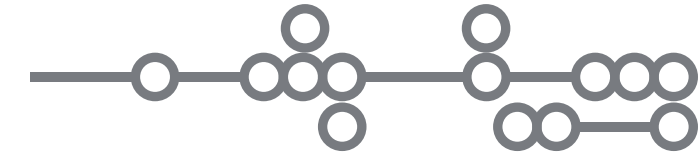
Khipu 2019 had three primary aims for strengthening AI in Latin America:
(1) To unlock Latin American talent through advanced training in machine learning;
(2) To foster AI research in Latin America by building an AI community;
(3) To drive adoption of AI-driven solutions through increasing awareness. These aims were informed by our knowledge of the state of AI in Latin America and the inspiration provided to us by our friends at the Deep Learning Indaba who showed us what's possible from such an event.

**1. Unlocking Latin American talent through advanced training in machine learning.**
Latin America has a strong university system, and many students are interested in AI. However, much of the foundational research in AI today is new and a large proportion of these advances have their epicentre in the developed world. With Khipu 2019 we sought to bring the best of Latin American and international talent in AI together to hold five days of intensive lectures in advanced AI topics for participants. We also recorded the lectures, and provided a live-stream with a system for remote participants to ask questions.

This has implications not just for Latin America, but has a global impact, with students from across all continents participating via the lecture materials made available and the live streams (see Appendix Website stats).

**2. Fostering AI research in Latin America by building an AI community.**
Latin America is a vast region and research instructions are spread across thousands of miles. Yet, collaboration is a key ingredient for quality research. At Khipu 2019, we heard many Latin Americans panelists say "we (the Latin research community) just don't know each other. We need more events like Khipu where we can meet".

After the first Deep Learning Indaba there were multiple examples of research produced from collaborators which grew out of the exchange of ideas which were inspired through conversations at the Indaba. Our hope was to build an event which would also spark many new AI-driven collaborations across Latin America.
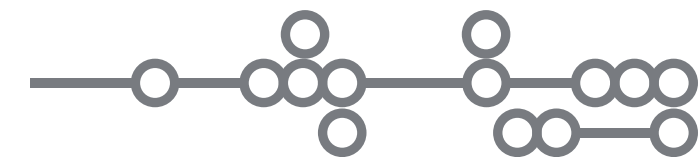
**3. Driving adoption of AI-driven solutions through increasing awareness.**
It almost goes without saying that the more opportunities a student, researcher or entrepreneur has to find support for their work, the more likely they are to succeed. In general, the infrastructure to support work in AI - access to venture capital, investment from local companies, research institutions well-funded by governments - is lacking in Latin America when compared with the major AI hubs around the world.

Our hope was that by hosting an event such as Khipu, and in particular bringing several high profile speakers to the region, we would spark a conversation in Latin America that might inspire governments and businesses to invest more in AI.

# Khipu as It Happened

# Khipu as It Happened

Khipu's general program was designed to inspire learning, provoke thought, and excite the next generation of AI researchers of Latin America. The goal was to spark enthusiasm among participants about research in AI and Machine Learning, and for them to learn about the different career opportunities and local capacity in the field. We created a structured curriculum from foundational material to real-world applications and advanced topics at the state-of-the-art. Activities were organised around four groups: Fundamentals, Advanced topics, AI applications, and Discussion.

## Fundamentals

The week started with a series of lectures covering the fundamental aspects of current AI technologies. Each lecture was linked to a practical coding session for participants to get hands-on experience.

- Prof. Luciana Ferrer (Universidad de Buenos Aires) covered Machine Learning fundamentals focusing on evaluation practices, a key concept to estimate the generalization accuracy on unseen data.
- Prof. René Vidal (Johns Hopkins University) covered Deep Learning Fundamentals and provided a detailed discussion on the mathematical reasons behind the success of Deep Learning methods.
- Prof. Enzo Ferrante (Universidad Nacional del Litoral) and Prof. Juan Carlos Niebles (Stanford University) discussed the principles of Convolutional Neural Networks, with emphasis on image and video recognition and understanding.
- Dr. Ian Goodfellow (Apple Inc) surveyed the history of Generative Models highlighting recent techniques using Deep Learning. He covered in detail Generative Adversarial Networks: a technology that he pioneered and has received significant attention since then.

- Prof. Kyunghyun Cho (New York University and Facebook AI Research) gave an overview lecture on Recurrent Neural Networks, one of the core Deep Learning architectures for analyzing sequences.
- Dr. Nando de Freitas (DeepMind) presented an introduction to Reinforcement Learning, an area that has sparked huge excitement in the field of AI and robotics in recent years.

## Advanced topics

Later in the week, we hosted several talks discussing advanced topics in AI. The goal was to give a sense of the current state-of-the-art describing challenging open problems and potential research directions.

- Prof. Yoshua Bengio (Mila, Université de Montréal), one of the 2019 Turing award winners, gave a lecture titled "Perspectives on AI: Next Steps for Deep Learning".
- Dr. David Lopez-Paz (Facebook AI Research) gave a talk titled "A casual tour of causality", providing a fun and comprehensive overview of the field of Causality.
- Prof. Pablo Musé (Universidad de la República), provided a historical overview on modeling natural images, and covered several applications in video and image processing.
- Prof. Lorena Etcheverry (Universidad de la República), addressed the general problem of data anonymization in Learning Analytics, focusing on current challenges and open questions.
- Dr. Martin Abadi (Google Research) lectured on Privacy and Security problems in Machine Learning systems. Arguably one of the most important topics as more Machine Learning-based models are commercially deployed.

# Khipu as It Happened
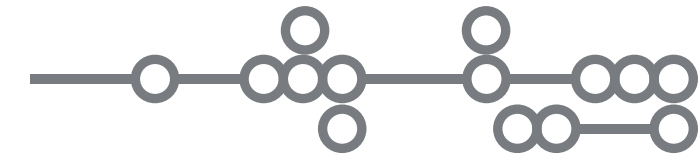
• Dr. Oriol Vinyals (DeepMind), talked publicly for the first time about AlphaStar, the first AI agent to defeat a professional player in the game of StarCraft, which was considered a "grand challenge" for AI research.

• Dr. Bianca Zadrozny (IBM Research, Brazil), talked about the use of Machine Learning techniques for the problem of subsurface characterization. She discussed the use of conditional GAN models for the improvement of the resolution of seismic images.

In addition to the lectures described above we hosted two parallel sessions on fundamental topics in AI, namely, Natural Language Processing and Computer Vision.

## AI applications

The programme included lectures providing several examples and applications of AI in use today. The goal was to show how the fundamental ideas covered in Khipu's program can be applied to real world problems and benefit society.

• Prof. Guillermo Sapiro (Duke University) was our keynote speaker and gave an inspiring talk on using AI to assist early identification of autism in children.

• Dr. Danielle Belgrave (Microsoft Research), "Machine Learning for Healthcare", provided a thorough overview on Machine Learning techniques for improving different aspects of healthcare.

• Prof. Claire Monteleoni (University of Colorado Boulder) talked about Machine Learning for the Study of Climate Change. She described the fundamentals of Climate Informatics and the state-of-the-art in the field. Prof. Monteleoni encouraged participants to work on this important and timely topic.

• Prof. Chelsea Finn (Stanford University and Google AI), lectured on the use of Reinforcement Learning in the field of robotics, reviewing from basic to state-of-the-art methods.

• Dr. Jeff Dean (Google AI) presented a talk titled "Deep Learning to Solve Challenging Problems" in which he highlighted several recent research accomplishments of Google AI, including the use of machine learning for healthcare, robotics, language understanding and engineering the tools of scientific discovery.

## Discussions

The general programme included the following events to encourage reflection as a community around important topics in the AI agenda, specifically AI in and for Latin America, Ethics, Security, and Diversity and Inclusion.

**AI for Social Good:** Panelists Dr. Alejandro Noriega Campero (MIT and Prosperia AI), Dr Cecilia Aguerrebere (Plan Ceibal, Uruguay), Dr. Jeff Dean (Google AI) and Prof. Guillermo Sapiro (Duke University) discussed how we can leverage the recent advances in Machine Learning and AI to build better tools and solutions for applications targeted towards social good. Starting with the keynote talk on the use of ML systems to assist in autism detection, Khipu's general programme strived to encourage community engagement and reflection on these topics.

**Women in AI:** We organised a Women in AI event that was generously sponsored by Google. The purpose of this event was to enhance the experience of women in AI and to discuss options to foster, encourage and support greater diversity in the Latin American AI community, by highlighting diverse career paths: from academia, to industrial research, to applied machine learning. We

# Khipu as It Happened

had outstanding panellists: Prof. Sandra Avila (University of Campinas), Prof. Chelsea Finn (Google AI / Stanford University), Prof. María Simon (Universidad de la República, Uruguay), Dr. Giulia Pagallo (Apple), Dr. Nando De Freitas (DeepMind) and Dr. Guillermo Moncecchi (Ministry of Industry, Energy and Mining Republic of Uruguay). Each of them discussed their personal career journey and experiences in machine learning. Participants had the opportunity to ask questions and network.

**Life of a Machine Learning startup:** Panelists Martín Alcalá (Tryolabs/CUTI), Thiago Cardoso (Hekima), Mario Guajardo (Google), Matthieu Jonckheere (Universidad de Buenos Aires/CONICET), Agustina Sartori (GlamST), discussed the challenges & opportunities faced by machine learning startups in Latin America. They provided insights on their personal journey in creating and managing successful machine learning-centric companies.
We aimed for participants to interact and learn from each other by hosting poster sessions, spotlight talks by researchers from the region, and several networking opportunities.

**Poster Sessions:** We had three poster sessions designed to reflect the intensity and format of those held in major Machine Learning conferences. With 141 posters presented, the diversity and quality of work was truly exceptional, covering from basic research to a large number of real world applications. A complete list of the posters can be found here.
Spotlight Talks: We organized three sessions of short talks, where leading researchers and professors from the Latin-American region presented the main interests of their research groups. These sessions were scheduled early in the week to seed potential interactions during the networking sessions.

**Sponsor stands:** The goal was for participants to have direct contact to leading local and international companies in the field. Attendees could see first hand the high-profile companies currently operating in the region, what career paths exist, and to have direct opportunities for future employment.

**Networking opportunities:** We organized several events designed to facilitate networking, discussion of different career opportunities, and sharing of ideas to increase visibility and participation of Latin American researchers in the field.

# Khipu as It Happened

Program details as well as the videos and slides for the lectures can be found at https://khipu.ai/program/.

| | domingo 11/10 | lunes 11/11 | martes 11/12 | miércoles 11/13 | jueves 11/14 | viernes 11/15 |
|---|---|---|---|---|---|---|
| 7:00 a. m. | | | | | | |
| 7:30 a. m. | | | | | | |
| 8:00 a. m. | | 8:15 Opening words | | | | |
| 8:30 a. m. | | Keynote: Machine Learning Challenges and Opportunities of Computational Behavioral Phenotyping in Developmental Health (Guillermo Sapiro) | Convolutional Neural Networks II (Juan Carlos Niebles) | Machine Learning for Healthcare (Danielle Belgrave) | Climate and AI (Claire Monteleoni) | Parallel Session 1: Advanced NLP / Frontiers in Computer Vision |
| 9:00 a. m. | | | | | | |
| 9:30 a. m. | | Machine Learning Fundamentals (Luciana Ferrer) | Reserved for Spotlights | Reserved for Spotlights | Sponsors talks | |
| 10:00 a. m. | | | Break | | | |
| 10:30 a. m. | | Break | Generative Models and Unsupervised Learning (Ian Goodfellow) | Break | Break | Break |
| 11:00 a. m. | | Deep Learning Fundamentals (René Vidal) | | Perspectives on AI (Yoshua Bengio) | Deep Learning Frameworks (Soumith Chintala) | Recent Advances in Deep Reinforcement Learning (Oriol Vinyals) |
| 11:30 a. m. | | | | | | |
| 12:00 p. m. | | Lunch | Lunch and Poster Session (1/3) | Lunch | Lunch and Poster Session (2/3) | Lunch and Poster Session (3/3) |
| 12:30 p. m. | | | | | | |
| 1:00 p. m. | | | | | | |
| 1:30 p. m. | | | | | | |
| 2:00 p. m. | | Convolutional Neural Networks I (Enzo Ferrante) | Recurrent Neural Networks (Kyunghyun Cho) | Reinforcement Learning (Nando de Freitas) | Robotics and Continuous Control (Chelsea Finn) | Parallel Session 2: AI for Social Good / Life of a Machine Learning Startup |
| 2:30 p. m. | | | | | | |
| 3:00 p. m. | | Reserved for Spotlights | | | Finding Causation (David Lopez-Paz) | |
| 3:30 p. m. | | | | | | |
| 4:00 p. m. | | Sponsors talks | Sponsors talks | Sponsors talks | Sponsors talks | Break |
| 4:30 p. m. | | Break | Break | Break | Break | Machine Learning for Subsurface Characterization (Bianca Zadrozny) |
| 5:00 p. m. | Open Ceremony, Round Table on AI in LATAM | Practical 1 CNNs / Optimisation for DL / Hackathon | Practical 2 RNNs / Transformer / Hackathon | Practical 3: Reinforcement Learning / Generative Models / Hackathon | Modeling the space of natural images: history and applications (Pablo Musé) | |
| 5:30 p. m. | | | | | Microdata anonymization for learning analytics (Lorena Etcheverry) | Deep Learning to Solve Challenging Problems (Jeff Dean) |
| 6:00 p. m. | | | | | Privacy and Security in Machine Learning (Martin Abadi) | |
| 6:30 p. m. | | | | | | |
| 7:00 p. m. | | Welcome event | Break | | Free | Free |
| 7:30 p. m. | | | | | | |
| 8:00 p. m. | | | How to write a great research paper | | Women in AI (hosted by Google) | Farewell dinner and party + Closing Remakrs |
| 8:30 p. m. | | | | | | |
| 9:00 p. m. | | | | | | |
| 9:30 p. m. | | | | | | |

# Diversity and Inclusion

# Diversity and Inclusion

Diversity and inclusion is a major driving force in the field of AI. In order to enrich the AI ecosystem in Latin America, we recognised it as important that the racial and gender diversity among participants at Khipu is representative of the rich cultural, racial and social heritage of Latin America. This is crucial for enabling AI development in Latin America to thrive.

We received a total of 1030 applications for Khipu 2019. Of these, 967 were students or people working in industry and 63 were university faculty. All selected participants were anonymously evaluated through an extremely competitive and rigorous review process conducted by at least two independent reviewers. We accepted a total of 332 participants consisting of 17 organizers, 203 applications, 75 sponsors and partnership and 37 speakers. Among applicants, 18.7% identified as female and 78.8% identified as male. However, due to the high quality and large number of applications, we were able to ensure that 37.5% of participants were female and 61.1% participants were male. Recognising the need to increase gender diversity in AI, Google hosted a Women in AI event for participants of Khipu.

The figures below illustrate the breakdown of participants by ethnicity. There were 18 different ethnicities identified among attendees, with an over-representation of self-identified whites (there were 48.8% whites compared to 36.1% whites in Latin America) and an underrepresentation of Coloured/mixed descent (24.4% of attendees vs 50.6% of the Latin American population). There was a representation of Amerindians and Indigenous Peoples which is almost similar to the distribution of this ethnicity in the Latin American population (9.2%). These imbalances in racial distribution are reflective of the imbalances among applicants.
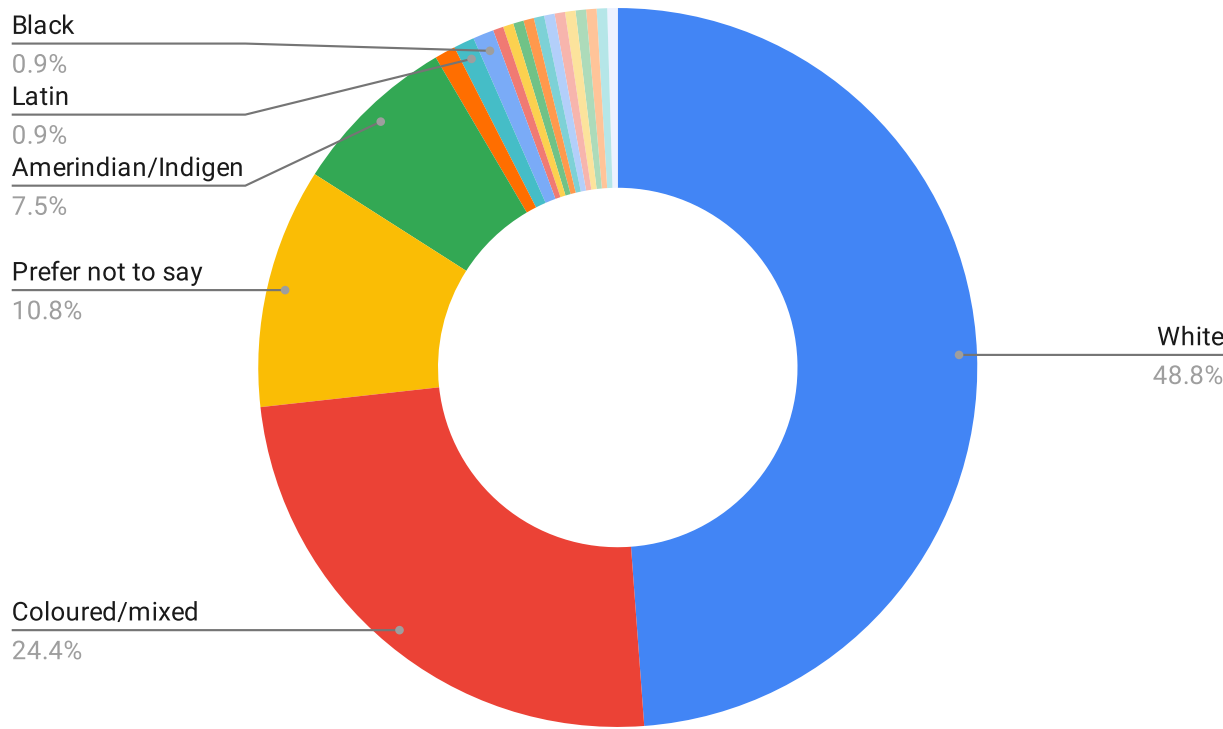


Figure 2: Overall breakdown of ethnicity at Khipu 2019

In this first edition of Khipu, we gave priority to applicants currently based in Latin America. This decision was based on space limitations and also due to the distances within and external to Latin America, meaning that in general, people based in Latin America have fewer opportunities to attend such events. Figure 3 shows the breakdown in geographical location by country based on (a) where applicants came from and (b) where applicants who were selected for attendance at Khipu were resident.
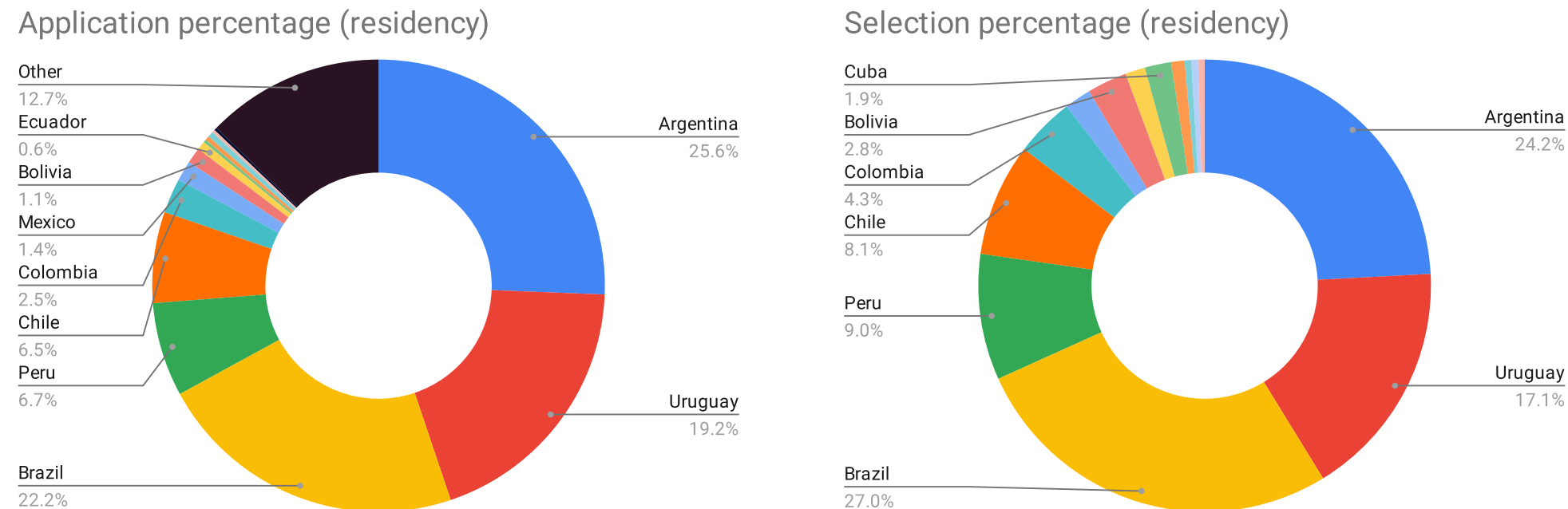
# Diversity and Inclusion

## Application percentage (residency)

Other
12.7%

Ecuador
0.6%

Bolivia
1.1%

Mexico
1.4%

Colombia
2.5%

Chile
6.5%

Peru
6.7%

Brazil
22.2%

Argentina
25.6%

Uruguay
19.2%

## Selection percentage (residency)

Cuba
1.9%

Bolivia
2.8%

Colombia
4.3%

Chile
8.1%

Peru
9.0%

Brazil
27.0%

Argentina
24.2%

Uruguay
17.1%

Figure 3: Breakdown of countries where applicants came from (left hand side) vs proportions of participants selected to attend Khipu 2019 (right hand side)

As part of our endeavours to make the event more inclusive, we had an open livestream for the whole event. Six universities in Panama contacted us and had a "watch party", and people from 73 different countries were connected to the streaming at some point. The recordings and slides for many talks are available at https://khipu.ai/program/. The widespread access of these talks have demonstrated that Khipu not only had impact within Latin America, but within the wider global AI community.

Thanks to the generosity of our sponsors, we were able to award a total of 156 grants. 125 of these grants were for Transport and Accommodation, 9 for accommodation only, 22 for transport only, 21 grants were awarded to professors. 100% of the requests for grants from students and academics based in Latin America were awarded. Jeff Dean, the Chief of AI from Google, also announced in his talk the availability of free cloud TPUs for all Khipu attendees (5 on-demand + 20 preemptible Cloud TPU devices per person, available for several months).

# Financing

# Financing

Khipu financing comes completely from our generous set of sponsors. The sponsorship categories were allocated in four tiers: Platinum, Gold, Silver and Bronze.

Khipu had 21 sponsors (see Appendix Sponsors for a full list): 4 Platinum sponsors, 6 Gold sponsors, 2 Silver sponsors and 9 Bronze sponsors. Khipu's total expenses were USD238,861.00 distributed as shown in Table 1.

Thanks to our generous sponsors and the fact that several speakers covered their own travel and accommodation expenses, we were fortunate enough to raise 120% of our required budget for Khipu 2019. Rather than expanding our budget, we continued to operate in a cash conscious manner and will be reinvesting the surplus money into scaling the next Khipu to include even more participants.

All the requested travel and accommodation students' scholarships were granted: 125 travel and accommodation, 22 travel only and 9 accommodation only. Speakers and professors who requested travel or accommodation support were also fully covered. Registration was free for all students, academics, and members of non-profit organisations.

| Categories | Budget | Notes |
|---|---|---|
| Events and catering | 34.3% | All catering, networking events. |
| Participants support | 43.8% | Travel and hotel support for students and speakers. |
| Materials and facilities | 11.2% | Facility maintenance, poster boards, transportation. The venue was sponsored. |
| Teaching support | 0.7% | Facilities AV assistance and tech support. |
| Community and programmes | 1.8% | Community support, web design and maintenance, photography and videos. |
| Administration | 8.2% | Secretary, legal, finance, risk, comms, etc. |

Table 1: Distribution of budget allocation across different categories

# Khipu Through the Eyes of the Participants

# Khipu Through the Eyes of the Participants
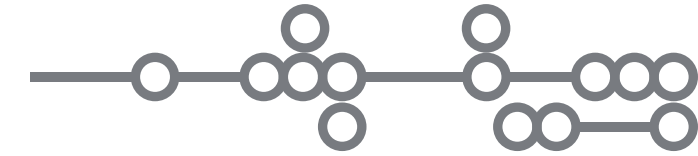
Khipu 2019 has been about educating, engaging, collaborating and fostering the community of AI in Latin America. In this section, we highlight some of the key moments and feedback from the participants and sponsors of Khipu. One of the highlights which was a symbolic representation of Khipu, was when Omar Florez, who is part of LatinX, brought us a real khipu handmade by a local from his town in Peru. He also gave a talk explaining khipus as an ancient data system used by the Incas, that stores numeric and non-numeric records.

In her post My Experience at Khipu AI 2019, Beatriz Ribeiro, from Brazil, starts by sharing the difficulties of doing research with limited resources, and states: "Spending a week surrounded by so many interesting people was certainly motivating for each one of us. We felt part of a community ... A successful academic career seemed like a less impossible goal and also totally worthy and rewarding." One of the highlights for her was the Women in AI event. "Remember what I said about that feeling of isolation that researchers often feel? I believe it is much worse when it comes to female researchers. The lack of representative female figures makes it feel like this career is not for us. But the room was filled by amazing women and this motivated me even further."

Having the opportunity to interact with world-class researchers who work at the cutting edge of AI was another highlight for many attendees. In her post Attending the biggest event of AI and Machine Learning in Latin America: Khipu, Roberta Duarte, she shares her enthusiasm when Nando and Jeff Dean came to talk about her research in using Deep Learning for black hole weather forecasting.

Other interesting blog posts around Khipu are: The 8 main takeaways from Khipu 2019 written by TryoLabs, one of our local sponsors, and another blog on Khipu 2019 and the State of AI Research in Latin America.

One of the highlights in terms of outcomes from Khipu had been as a result of the availability of TPUs from Google for all Khipu participants, which Jeff Dean announced in his talk, some of the participants of Khipu released a BERT model trained exclusively with Spanish data (BETO). The model can be found at https://github.com/dccuchile/beto

# Conclusion

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Having concluded the first ever Khipu we will now be looking to capitalise on the energy all the participants, speakers, and sponsors brought to the event and take that momentum to organise the next Khipu. We will take with us the lessons we've learned, and build on our successes. We will be looking for sponsors to continue to allow us to facilitate wide and diverse participation from across the region. We will be seeking to partner with local universities, companies, and research institutions to encourage applications and perhaps organise watch parties for those unable to attend in person.

Given the seriousness and uncertainty of the COVID-19 pandemic, it is not possible for us to guarantee the Khipu experience we strive for, and therefore, we have decided not to host an in-person event in 2020. We welcome suggestions on creative ways to engage our community, so please reach out at info@khipu.ai with ideas for staying connected!

Nonetheless, we are committed to hosting an event in 2021, and are currently developing other initiatives to help the local AI Latin American community in the meantime. We will be communicating more about this soon!

[1] A typical flight from Mexico City to Buenos Aires runs around $850. In comparison, the average flight from Cairo to Johannesburg costs around $450.

[2] See for example, successes in Starcraft beating top players; claims of AI outperforming radiologists in detecting cancer; or the DeepFake algorithm generating realistic videos of Jim Carrey staring in The Shining instead of Jack Nicholson.

[3] Today 81% of the population in Latin America lives in an urban area, making it the second most urbanized region of the world, behind only North America (82%) and well ahead of Asia (50%) and Africa (43%). Source: Building globally competitive cities: The key to Latin American growth.

[4] See more in the McKinsey Report: Building globally competitive cities: The key to Latin American growth

[5] Cadena, Andrés, et al. "Where will Latin America's Growth Come From?" Mckinsey Global Institute, Apr. 2017.

[6] The number of tertiary degrees in science and engineering across the region is relatively high according to data from the OECD. Mexico, Chile, Colombia, and El Salvador all have a higher % of tertiary degrees in science and engineering than the OECD average. To compare, Japan is equal to the average, and the USA is well below. See Heermann, Justin, et al. "Technology Trends in Latin America and Their Social and Economic Impact".

[7] Latin America has a strong university system, and culture of studying STEM. Mexico, for example, produces more engineers annually than Germany. See Booth, William. "Mexico Is Now a Top Producer of Engineers, but Where Are Jobs?" Washington Post, 28 Oct. 2012. (link)

[8] See the AI Now 2019 Report from the AI Now Institute.

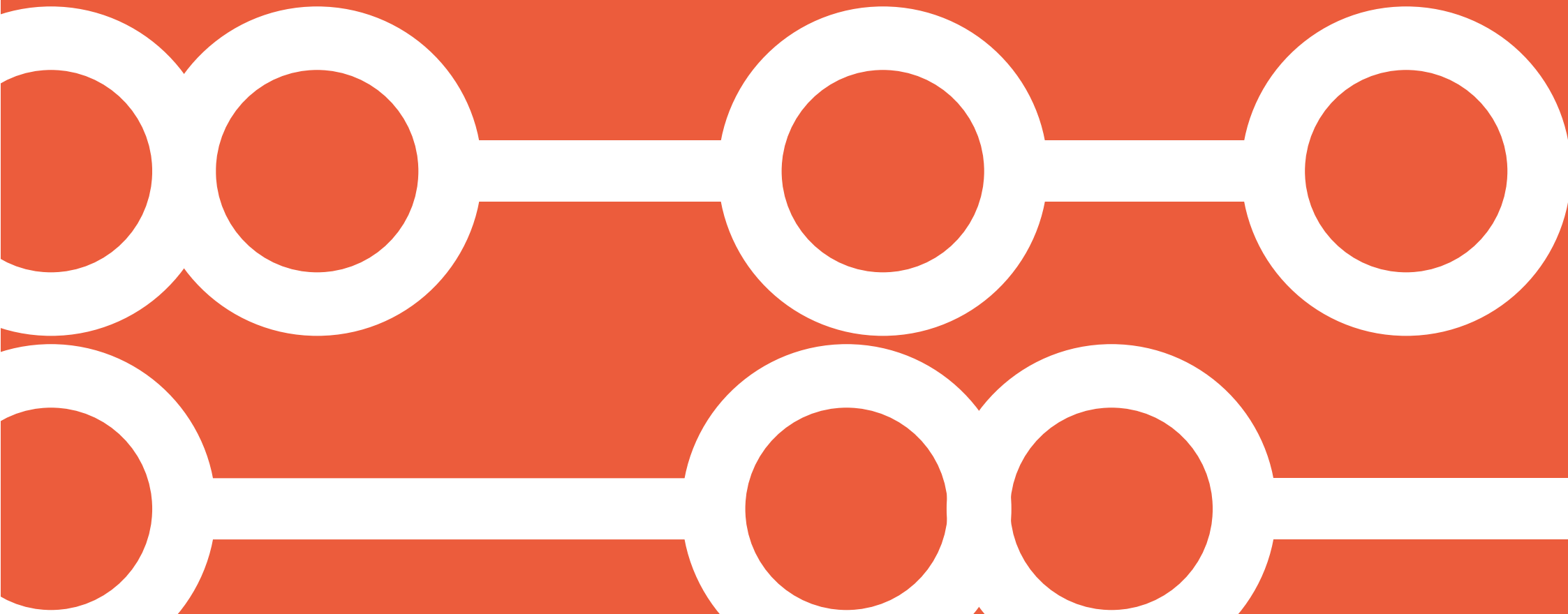[9] Based on UNESCO data from the databank

[10] The AI Index Report, Stanford, 2019 (link)

[11] "How Artificial Intelligence Can Drive South America's Growth", Accenture, 2017 (link)

[12] Source data: Artificial Intelligence Index Report 2019

# Appendices

# Appendices

FACULTAD DE INGENIERIA    Google    antel    DeepMind

tryo·labs    mercado libre    UTE La energía que nos une    Globant>    Apple    ASAPP

ULTA BEAUTY    Facebook    QUANAM    dsense    MIEM MINISTERIO DE INDUSTRIA ENERGÍA Y MINERÍA    ADME    IDATHA    Plan Ceibal    agesic DESARROLLANDO EL URUGUAY DIGITAL    nubank    HEKIMA

antel    vera tv

UNIVERSIDAD DE LA REPÚBLICA URUGUAY    Google Cloud

PRESIDENCIA Secretaría Nacional de Ciencia y Tecnología    MIEM MINISTERIO DE INDUSTRIA ENERGÍA Y MINERÍA    Uruguay Natural Ministerio de Turismo 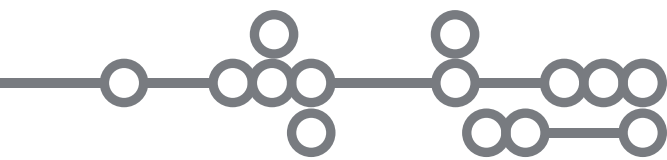   Uruguay XXI INVESTMENT, EXPORT AND COUNTRY BRAND PROMOTION AGENCY    30 cuti CÁMARA URUGUAYA DE TECNOLOGÍAS DE LA INFORMACIÓN
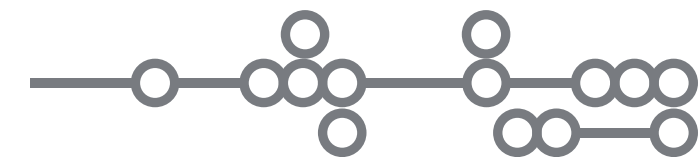
# Appendices

**Website stats**

Visit statistics for the khipu.ai website during the event.

**Top country views of Khipu's website during the event**

| Country | Visits | Country | Visits |
|---|---|---|---|
| Uruguay | 18073 | France | 177 |
| United States | 2176 | Canada | 165 |
| Argentina | 1970 | Mexico | 137 |
| Brazil | 1897 | China | 125 |
| United Kingdom | 617 | Turkey | 123 |
| Chile | 476 | Switzerland | 79 |
| Peru | 431 | Australia | 60 |
| Panama | 371 | South Korea | 56 |
| Spain | 350 | Hong Kong SAR China | 50 |
| Colombia | 290 | Taiwan | 49 |
| India | 268 | Belgium | 47 |
| Germany | 203 | Austria | 47 |



1      18,073
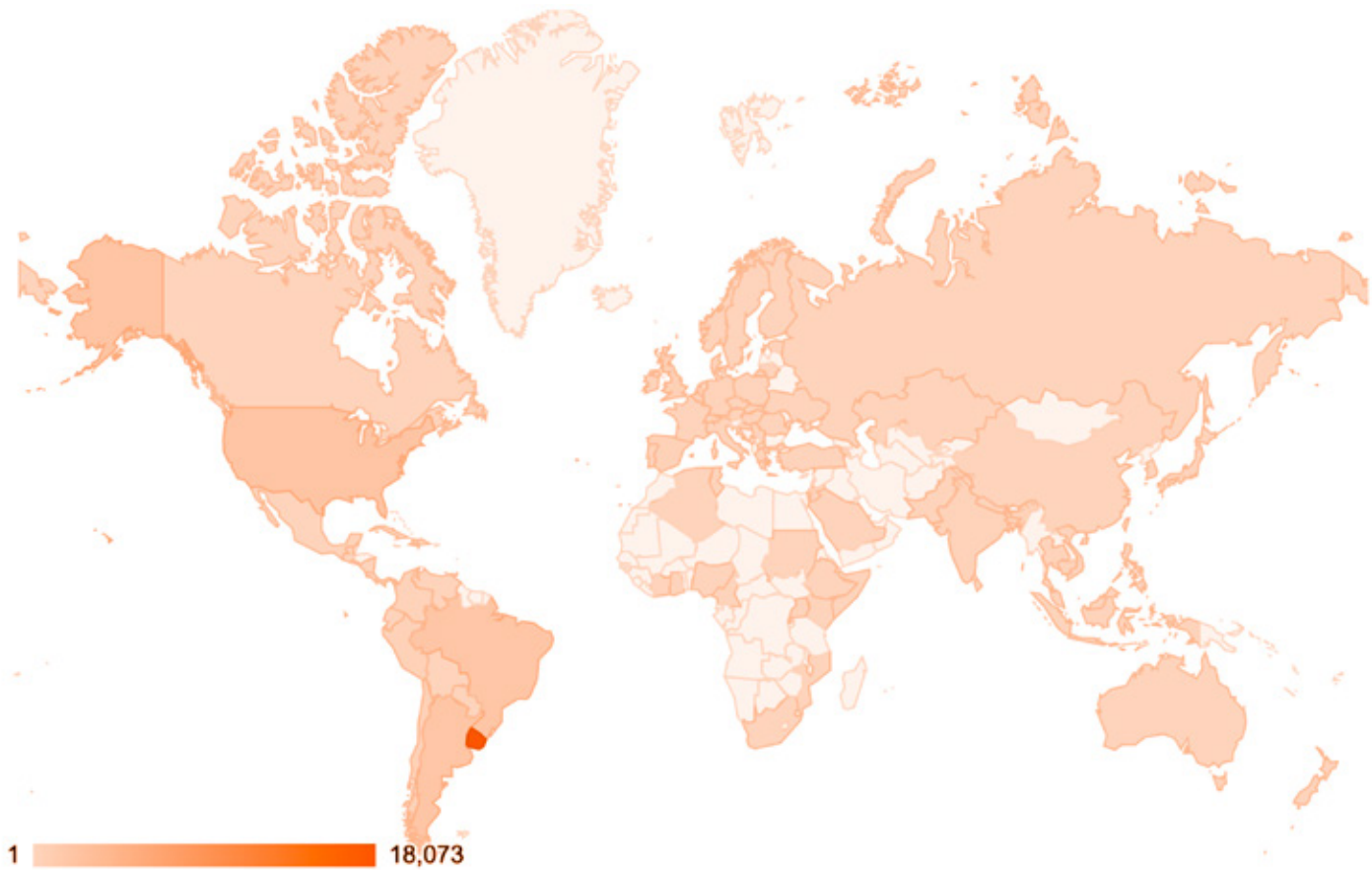
**Khipu General Committee**

Meire Fortunato
Pablo Sprechmann
Federico Lecumberry
Danielle Belgrave
Martín Arjovsky

**Khipu 2019 Committee**

Federico Lecumberry
Mauricio Delbracio
José Lezama
Pablo Sprechmann
Meire Fortunato
Martín Arjovsky
Pablo Musé
Danielle Belgrave
Alicia Fernández
Diego de las Casas
Gabriella Rojas
Martín Rocamora
Pablo Cancela
Marcelo Fiori
Álvaro Gómez
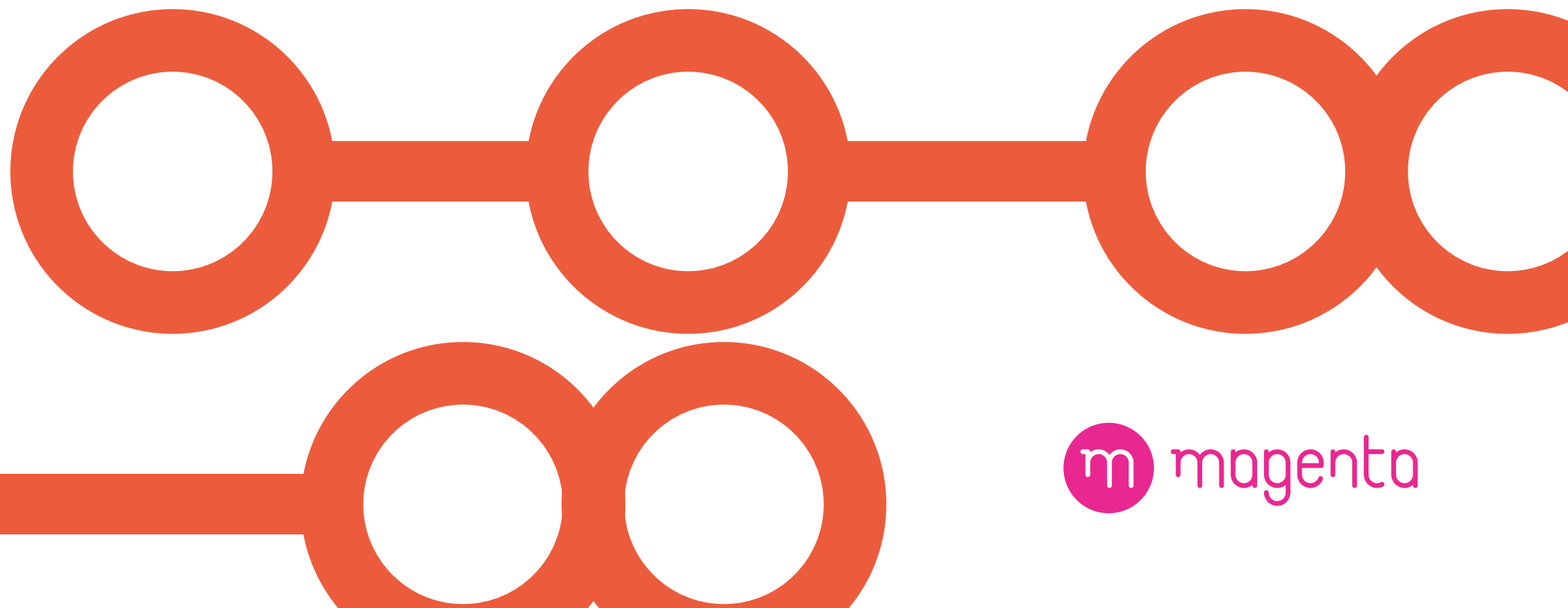
**Khipu 2019
special thanks to**

María Inés Fariello
Ignacio Ramírez
Gregory Randall
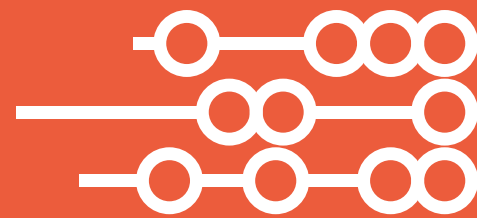Andre Saraiva
Salvador Vazquez
Shakir Mohamed
Andre Barreto

**Khipu 2019 Secretary**

We also thank Easy Planners for their assistance in the event's organization.

**Khipu 2019 Credits**

Khipu's logo created by Ernesto Barriola.
Web concept designed by Juan Vitureira.
Images of CNN visualization courtesy of Terence Broad.
Khipu's PDF designed by Nicolás Batista

magenta

# KHIPU

**Strengthening Artificial Intelligence in Latin America**

**Outcomes of the First Khipu Latin American Meeting in Artificial Intelligence**