Accelerating knowledge generation for data-driven decision making

Leveraging Artificial Intelligence and Big Data for **IFAD 2.0 –** Innovation Challenge 2019

WHAT ARE ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML)?

Artificial intelligence (AI) uses computers to extract information from new and existing sources of data and to automate decision-making processes. As an element of AI, machine learning (ML) comprises various methods that get computers to recognize patterns in data and use these patterns to make predictions.

How machine learning works:

1. Gather data
2. Process data
3. Apply ML. algorithms
4. Gather insights from the model
5. Test for accuracy
5. Visualization and analytics

Source: Ceres2030

How can AI and big data support IFAD's mission?

1. **Collect**, **repurpose** and **analyse** large amounts of internal and external data
2. **Uncover** patterns and trends
3. **Predict** performance and impact outcomes
4. **Guide** future investments

PROJECT OBJECTIVES

Systematize IFAD's investment portfolio

Identify what thematic areas IFAD invests in, through what types of intervention, in whom and where (intervention levels), and the expected outcomes

Enhance knowledge management

Apply data-driven decision-making to define key interventions and AI to speed up systematic reviews that uncover impact

Predict performance and impact

Develop algorithms that support project design through ex-ante predictions of performance and likelihood of positive treatment effects based on set of features

DATA

894 investment projects considered (grants excluded)

856 projects with at least one report **2302** documents in total

705 projects with disbursement data

562 projects with internal evaluation data

251 projects with external evaluation data

361 projects with COSTABs

19 projects with impact assessments

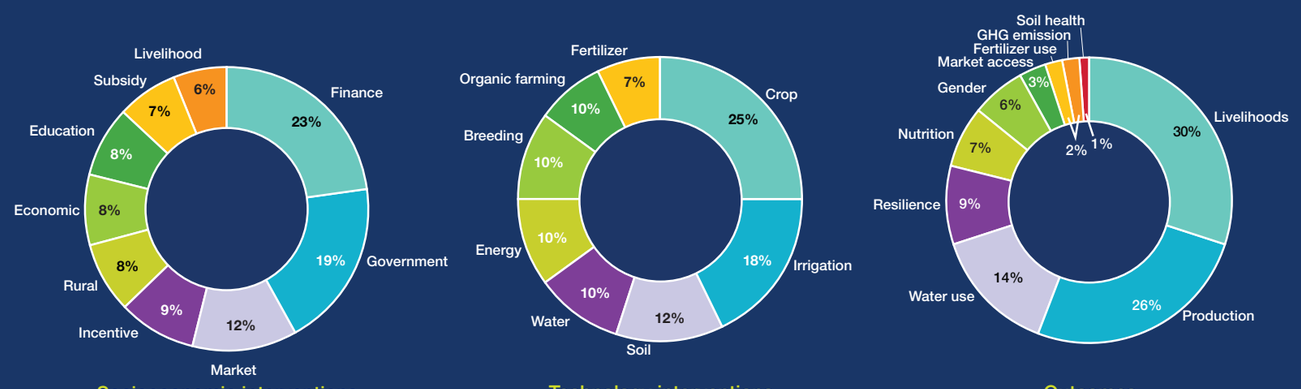
World Development Indicators for **120+** countries

METHODS

Text mining · Topic modelling · Predictive analytics · Systematic review & Meta-analysis

UNDERSTANDING IFAD'S INVESTMENT PORTFOLIO SINCE 1981

- Classes of interventions detected through machine learning: socioeconomic, technology, ecosystem and storage.
- Socioeconomic interventions represented 37% of the dataset, within which finance and government-related interventions were the most frequently reported. Technology interventions followed very closely (36%) and comprised primarily of crop and irrigation-focused activities.
- Ten outcome classes were also detected. Expected outcomes relating to livelihoods and production were the most mentioned within the documentation, followed by water use and resilience.
- As IFAD11 works towards mainstreaming climate change, gender, youth and nutrition, text mining uncovered an upward trend in reporting against them, especially with regards to climate change adaptation.
- Further text mining based on key terms related to Agenda 2030's Sustainable Development Goals indicated an increase in the presence of SDG-related content in project documentation across all 17 goals.

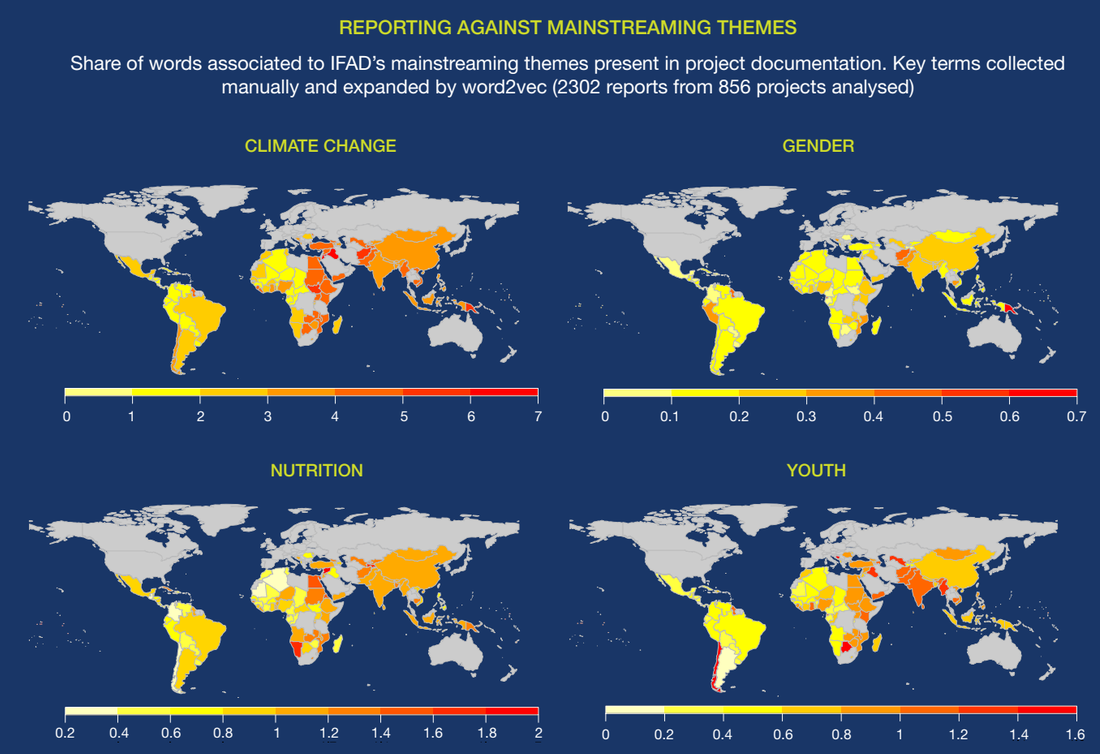


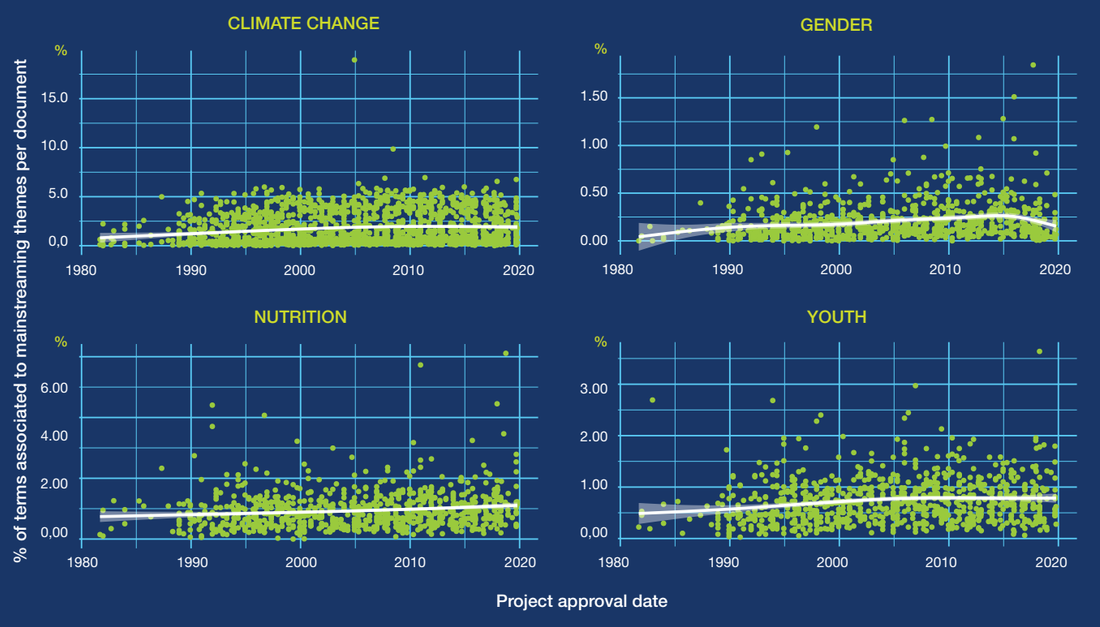
Socioeconomic interventions · Technology interventions · Outcomes

Detected through Ceres2030 model in documentation from 856 projects.

REPORTING AGAINST MAINSTREAMING THEMES

Share of words associated to IFAD's mainstreaming themes present in project documentation. Key terms collected manually and expanded by word2vec (2302 reports from 856 projects analysed)

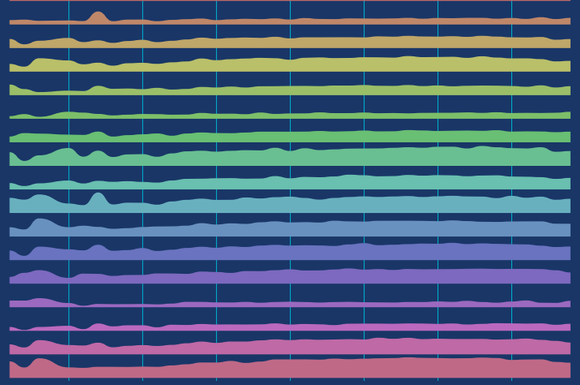




Time trend by project approval date (1981-2019)

REPORTING AGAINST SUSTAINABLE DEVELOPMENT GOALS

Share of words associated to SDGs present in project documentation, by year of approval (1981-2019). Key terms collected manually and expanded by word2vec (2302 reports from 856 projects analysed).



Goal 1: No Poverty
Goal 2: Zero Hunger
Goal 3: Good Health and Well-Being
Goal 4: Quality Education
Goal 5: Gender Equality
Goal 6: Clean Water and Sanitation
Goal 7: Affordable and Clean Energy
Goal 8: Decent Work and Economic Growth
Goal 9: Industry, Innovation, and Infrastructure
Goal 10: Reduced Inequalities
Goal 11: Sustainable Cities and Communities
Goal 12: Responsible Consumption and Production
Goal 13: Climate Action
Goal 14: Life Below Water
Goal 15: Life on Land
Goal 16: Peace, Justice and Strong Institutions
Goal 17: Partnerships

INFORMING FUTURE DECISIONS

- As IFAD12 reinforces the trend towards fewer, more focused, and larger investments in each country, as well as a focus on doubling impact and sustainability, gaining a global picture of the portfolio will support the achievement of strategic objectives and the SDGs.
- Topics detected through text mining were combined with disbursement data, ratings and World Development Indicators for over 120 countries to create a model that will predict the probability of project success and performance.
- Household data from IFAD10 impact assessments were used to develop a prediction model to map the probability of program success (positive outcome), as well as household and project characteristics that affect positive impact.

Next steps

- Scale up analyses to all IFAD evidentiary sources and refine algorithms
- Launch dashboard with customised search features and prediction tools to support the project cycle
- Systematic reviews of key development interventions, accelerated through Ceres2030 model to capture external evidence of impact and identify underevaluated areas to be investigated by IFAD-led impact assessments
- Embed predictive analytics to corporate reporting systems

Originator: Innovation Challenge 2019, IFAD
Contact: Alessandra Garbero, Senior Economist, RIA

IFAD
Investing in rural people