

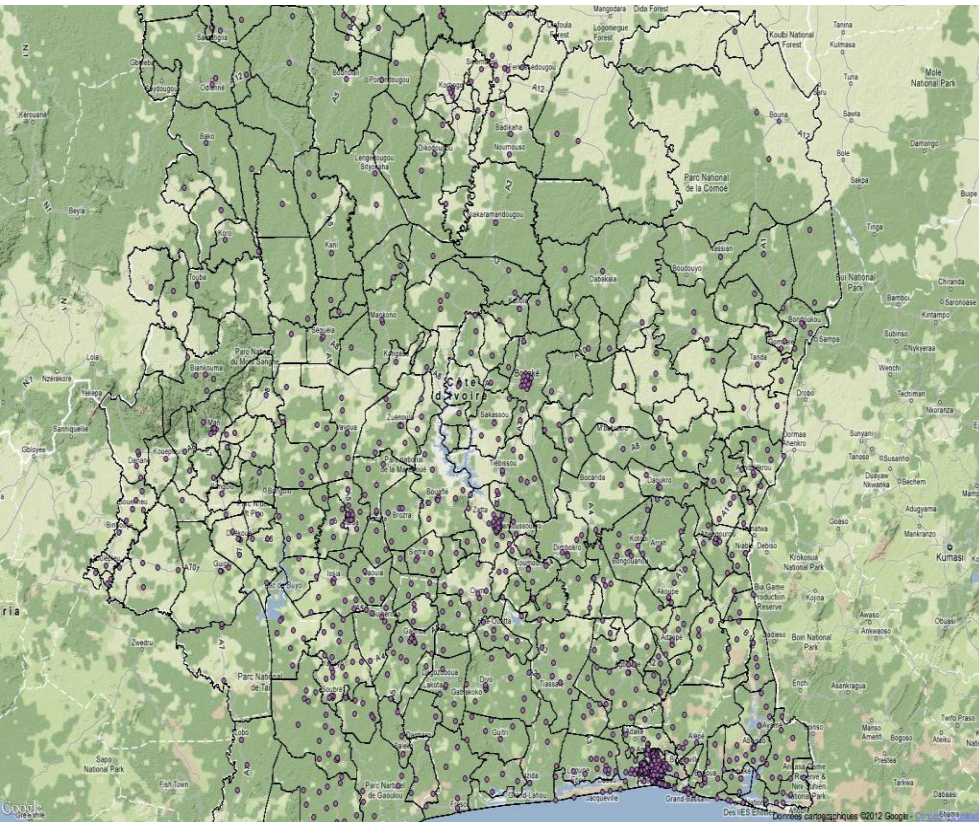
Data 4 Development (D4D)

Examples of results

6 November, New-York



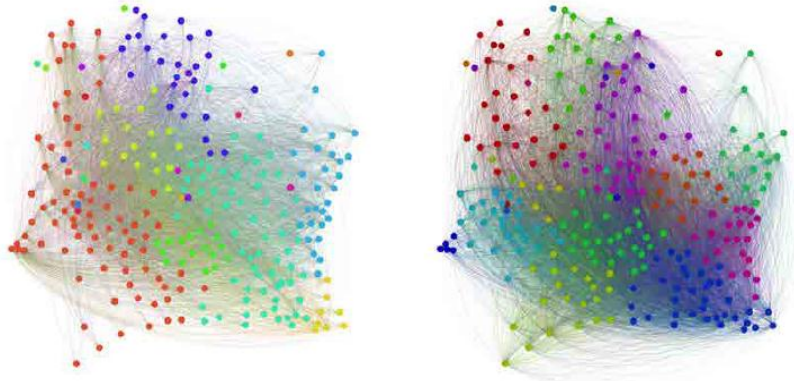
Data for Development in Ivory Coast, 2012-2013



- An Open innovation challenge in « Big Mobile Data »
- 4 strongly anonymised mobile data sets samples, released to the research community
- Data analysis aimed at helping the development of the country
- 260 universities and research labs registered, more than 80 submissions received at the end

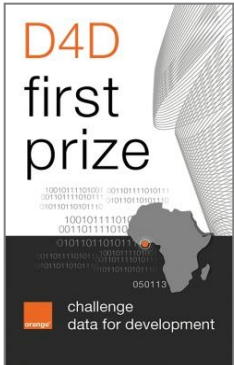


Use of Mobile Data for Disease containment



(a)

(b)



Geographic network obtained from call logs (a) and mobility traces (b). Color is used to indicate the community structure: nodes within the same community are represented with the same color.

Exploiting cellular data for disease containment and information campaigns strategies in country-wide epidemics

Human mobility and the underlying social structure of a population are important factors for the spreading of diseases in a population. By exploiting mobility patterns and social ties of people extracted from the available data, a model describing how diseases spread across the country can be built to identify optimal strategies

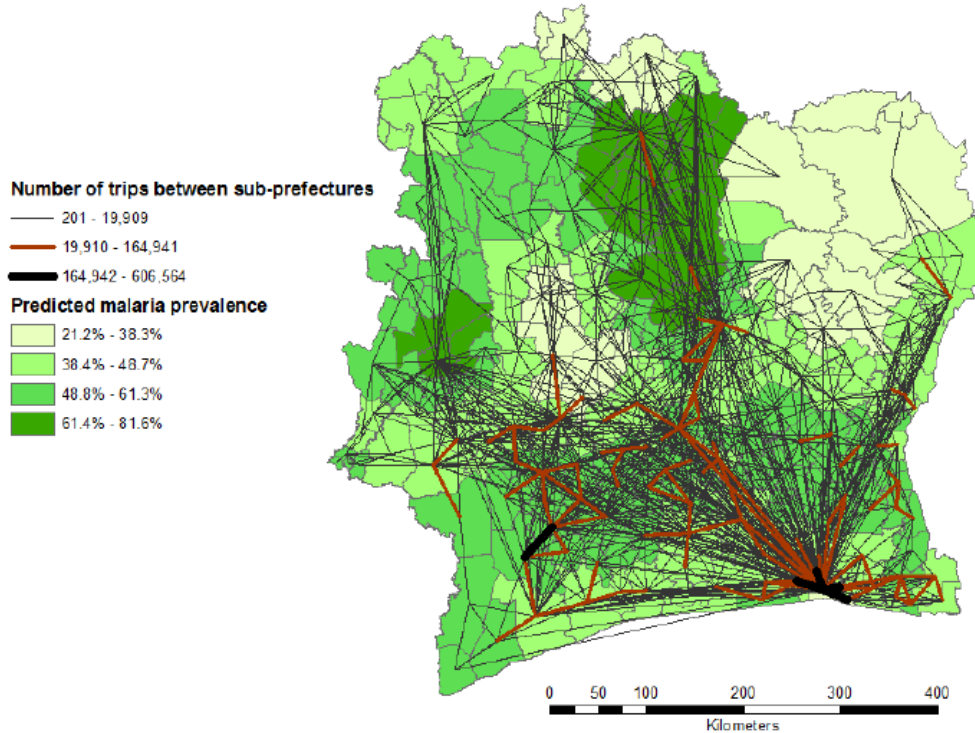
- A. Lima
- M. De Domenico
- V. Pejovic
- M. Musolesi

HEALTH AND EPIDEMICS

School of Computer Science, University of Birmingham, UK

Use of Mobile Data for Malaria Control

Malaria prevalence and mobility by sub-prefecture



the prevalence of malaria estimated by Raso et al, for clarity, only edges representing more than 200 trips over the 5-month observational period are shown.

HEALTH AND EPIDEMICS

#67

Human mobility and communication patterns in Côte d'Ivoire: A network perspective for malaria control

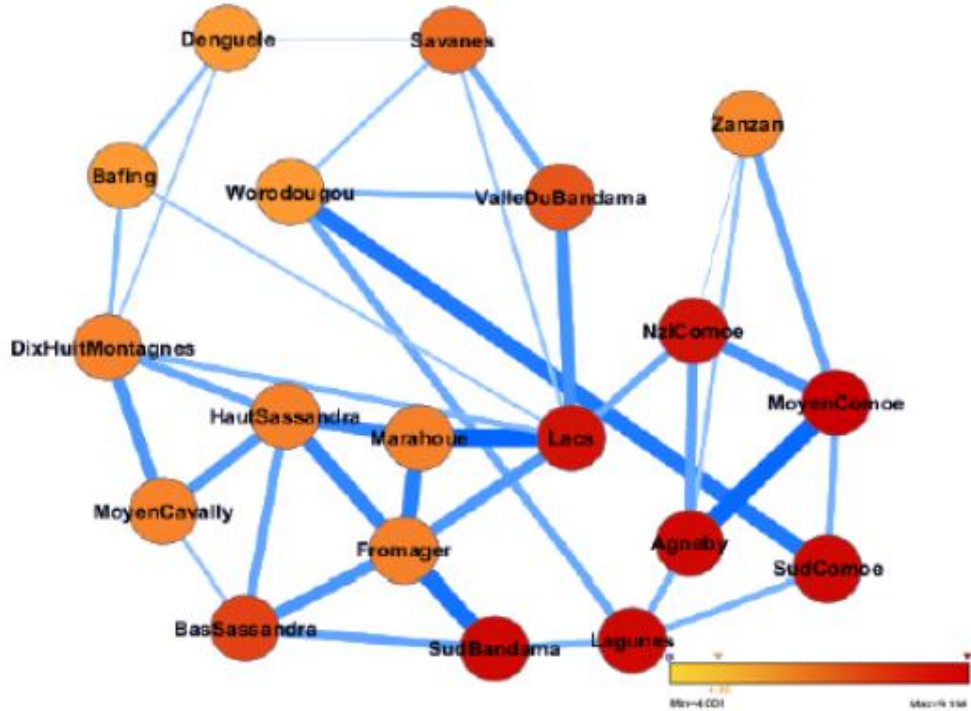
Human mobility patterns play an important role in regional transmission of malaria disease. The objective of this work is to assess the importance of mobility and communication patterns for malaria control efforts based on telephone usage behavior.

- Eva A. Enns
- John H. Amuasi



University of Minnesota School of Public Health

Use of Mobile Data for HIV distribution analysis



3NN migration graph: The nodes represent Ivory Coast regions, arranged in geographical order and colored according to HIV prevalence rates. Links are inferred from inter-region migration flows during six months. Their color and width are proportional to normalized flow between regions.

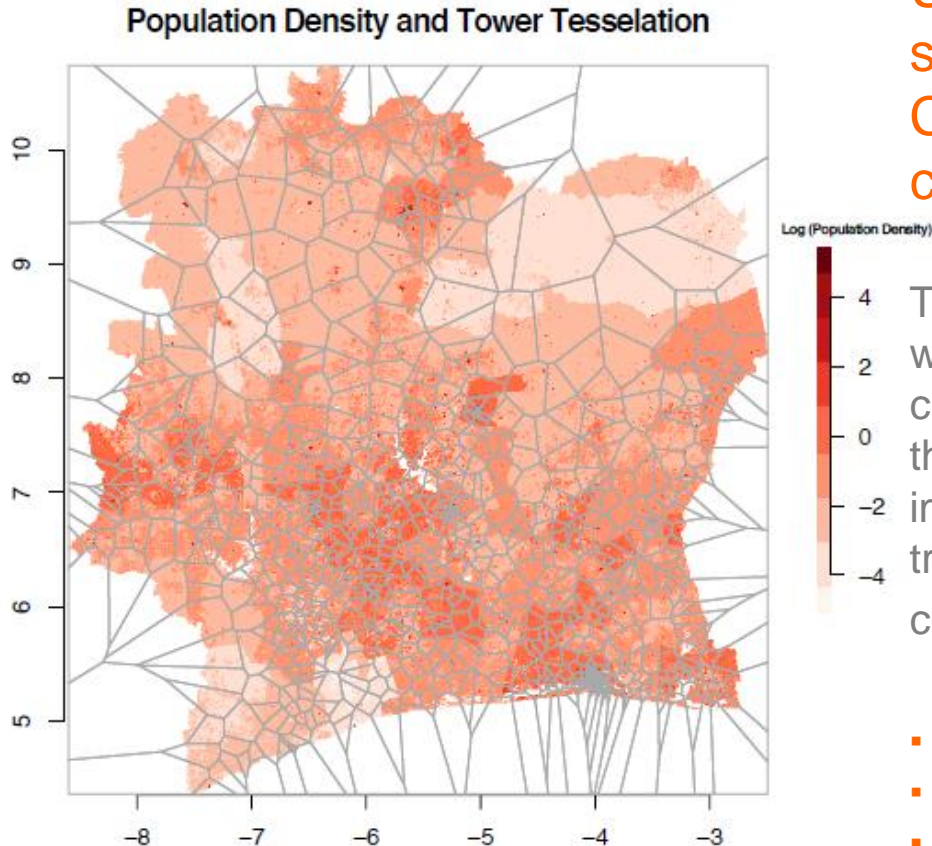
Linking the Human Mobility and Connectivity Patterns with Spatial HIV distribution

With geo-referenced mobile phone data and regional HIV prevalence rates, this project enables us to identify key elements that impact the rate of HIV infections and could explain the spatial structure of epidemics.

- Katarina Gavrić
- Sanja Brdar
- Dubravko Čulibrk
- Vladimir Crnojević

Faculty of Technical Sciences Novi Sad,
Serbia

Use of Mobile Data for Cholera analysis



Log population density and Voronoi tessellation of country by cell phone towers

HEALTH AND EPIDEMICS

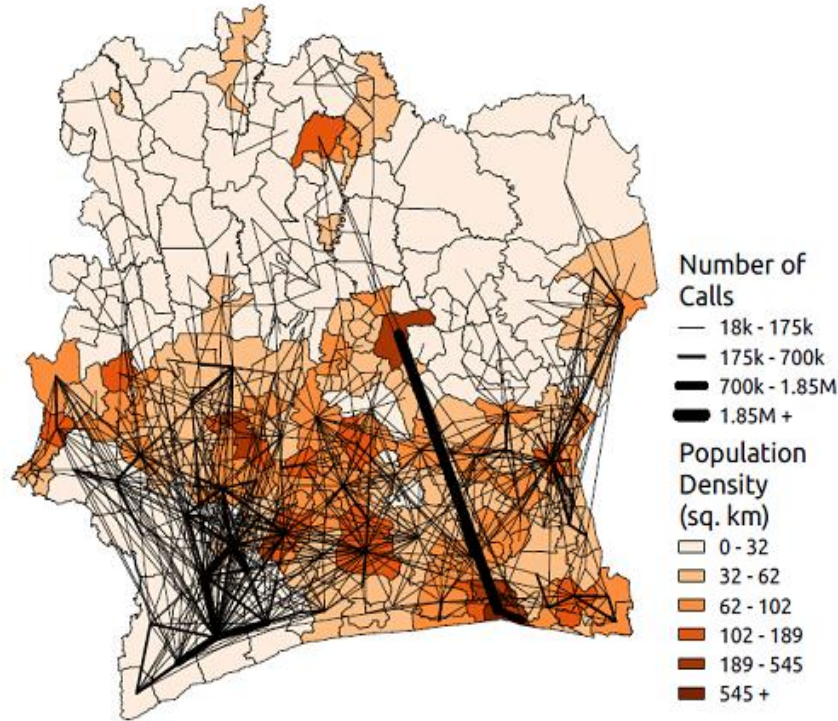
Using Mobile Phone Data to supercharge Epidemic Models of Cholera Transmission in Africa : a case study of Côte d'Ivoire

This project combines mobile phone records with detailed environmental data to drive a cholera transmission model. The results from this model (and extensions of it) can help improve our understanding of cholera transmission and guide targeted prevention and control efforts.

- Andrew S. Azman
- Erin A. Urquhart
- Benjamin Zaitchik
- Justin Lessler

Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University

Use of Mobile Data for Population sizing proxies



Egocentric and population-density patterns of cellphone communication in Ivory Coast

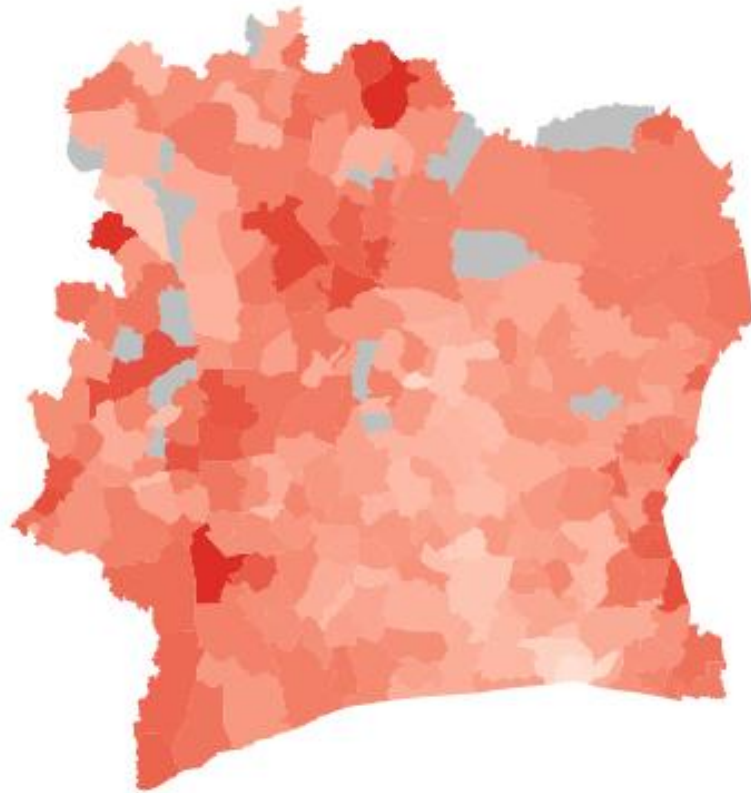
The number of phone calls can be used with appropriate correction factors (double SIM, penetration of Mobile on certain populations, activities, ...) to approximate the densities of populations at a granular level. New metrics like these could be used more frequently as proxies between proper statistical census

- Paul Schmitt
- Morgan Vigil
- Mariya Zheleva
- Elisabeth M. Belding

Department of Computer Science
University of California, Santa Barbara

Use of Mobile Data for Poverty index approximations

Ubiquitous sensing for mapping poverty in developing countries



Poverty map in finer granularity estimated based on the diversity of connections between antenna

In developing countries, census data may be collected infrequently, thus failing to accurately reflect the changes associated with a growing economy.

To overcome this problem, this research team mined aggregated mobile phone communication data to estimate socioeconomic indicators in Côte d'Ivoire and discovered a number of features that have a strong correlation with poverty indicators.

Thanks to this data which could be updated frequently or continuously, poverty estimates at a spatial resolution finer than previously available could be provided.

- Christopher Smith
- Afra Mashadi
- Licia Capra

Use of Mobile Data for new development metrics

Understanding the differing tribal and infrastructural influences on mobility in developing and industrialized regions

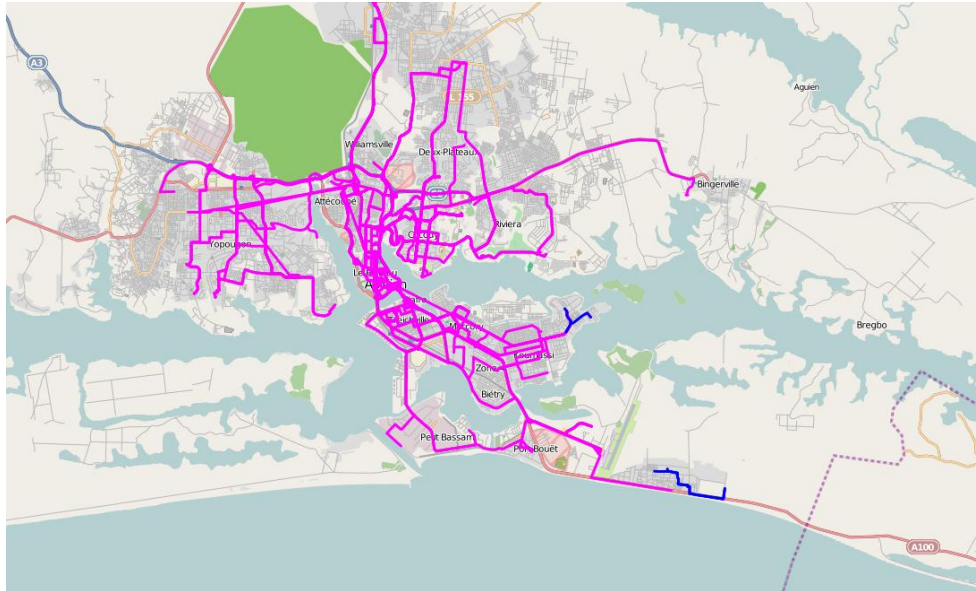
This study leverages mobile phone to analyze mobility patterns—such as differences in likelihood to travel, the time required to travel etc.—that are relevant to considerations on policy, infrastructure and economic development in developing regions, and compares it to more developed regions. Moreover, this study illustrates how cultural and lingual diversity can present challenges to mobility models that perform well for less culturally diverse regions.

Intra (a) and Inter (b) tribal migrations over the entire dataset. The color of the edges is logarithmically mapped based on the total flux of migrations between the two nodes

MOBILITY AND TRANSPORTATION

- A. Amini, K. Kung, C. Kang, S. Sobolevsky
 - C. Ratti
- SENSEable Citylab - MIT Cambridge

Use of Mobile Data for Urban Planning



All Aboard : a system for exploring urban mobility and optimizing public transport using cellphone data

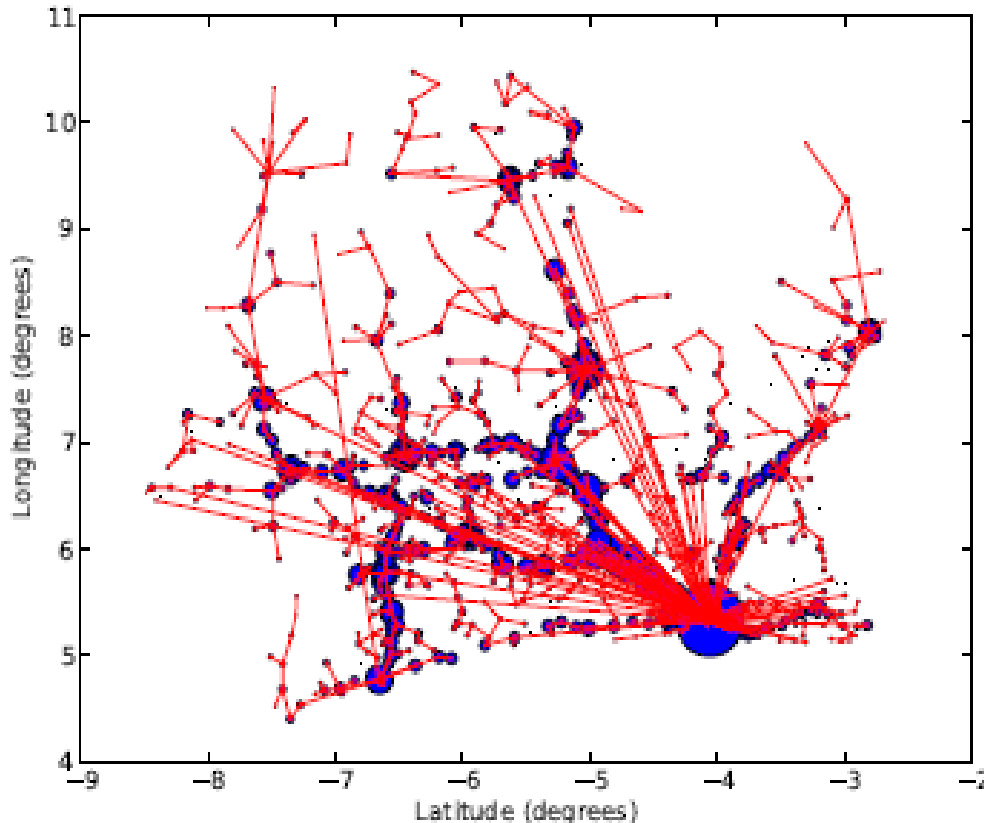
Mobile phone location data is used to infer origin-destination flows, which are then converted to ridership on existing transit network. This information enables transit operators to better match observed demand for travel with their service offerings and improve the fluidity of the cities, hence impacting cultural or economic development



Geographic networks obtained from mobility traces (left) and the call logs (right). Stronger links are more opaque.

- M. Berlingiero
- F. Calabrese
- G. Di Lorenzo
- R. Nair
- F. Pinelli
- M.L. Sbodio

Use of Mobile Data to model innovative ideas



Minimum spanning tree between cell towers in Ivory Coast, where connections are defined by common visitors in the Orange dataset, and the size of node represents betweenness centrality

Crowdsourcing physical package delivery using the existing routine mobility of a local population

In Ivory Coast, delivering essential items to remote area is usually difficult with conventional methods such as road network. This project proposed an alternative method of delivery, observing that distance between any two arbitrary points is covered by individuals who would visit these locations in daily life. Using a large location database of Ivorians, we can find the optimal route of distributing crowdsourcing aid by taking into consideration the daily life location behavior of individuals.

- J. McInerney
- A. Rogers
- N.R. Jennings

University of Southampton

Use of Mobile Data for (crowd sensing) energy reduction



Spatial Patterns of Call/SMS in Abidjan City

An Energy-Efficient Mobile Crowdsensing Mechanism (EEMC) by Reusing Call/SMS Connections

Mobile crowdsensing outsources the sensing tasks to mobile phone users. During the process, the cost to make a connection consumes the most of energy on mobile phone. By reusing the connections of call/SMS, EEMC mechanism promises to cut off the energy consumption of data transmission and sensing result collection. It also explores how to minimize the total energy cost by assigning tasks only to those users who have the highest probability of reusing connections.

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VI

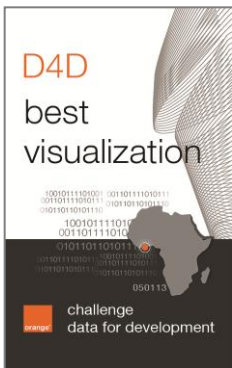
New tools to help making sense of Massive Data sets

Exploration and analysis of massive mobile phone data : a layered visual analytics approach

Here researchers present a system for the exploration and analysis of massive mobile phone data, using a visual analytics approach. It also enables early detections of different events by looking at the number of calls over locally concentrated communication channels, since the number of calls is strongly correlated with the occurrence of events.

- S. van den Elzen
- J. Blaas
- D. Holten
- J.K. Buenen
- J.J. van Wijk
- R. Spousta
- A. Miao
- S. Sala
- S. Chan

Eindhoven University of Technology
SynerScope BV
Prince of Wales Fellowship at MIT

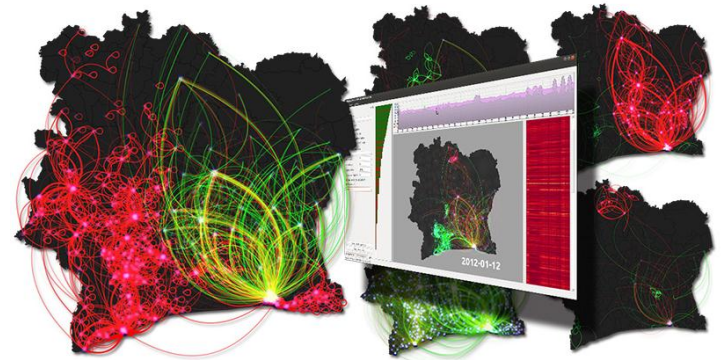


Different coherent components of the visual analytics solution for the exploration and analysis of Massive Mobile Phone Data in the context of the Orange Data for Development D4D-challenge

New D4D Senegal: results on 10 April 2015

250 registered projects from all over the world:

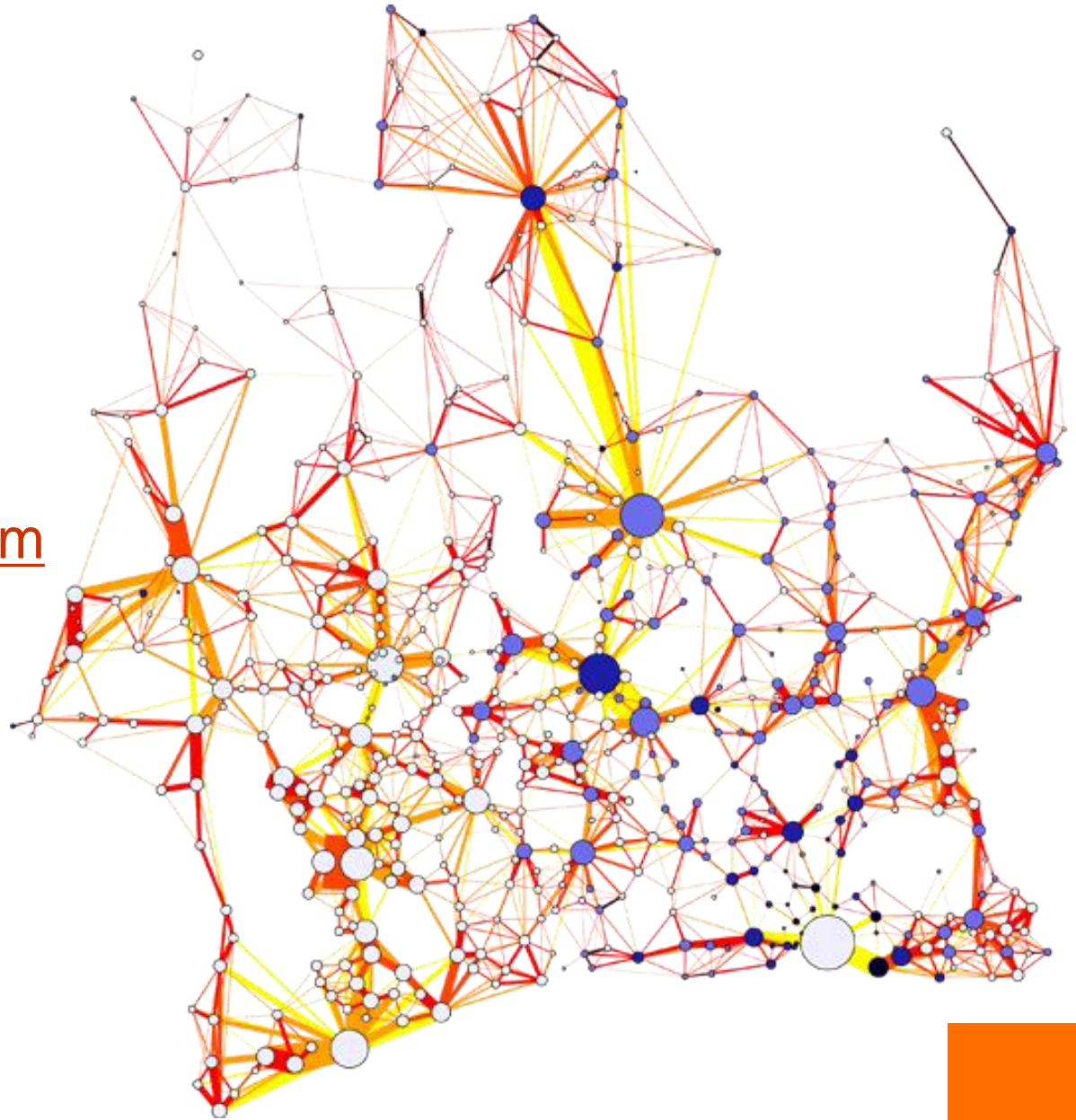
- **140 Teams working** on Data sets today, of which **11 teams in Senegal** alone
- Transport (33%), National statistics (30%) Health (20%), Agriculture, Energy, others
- Sponsored by Senegales Authorities
- Oversees by a Scientific Committee and by an External Ethic Panel



Merci

www.d4d.orange.com

#data4dev



contact:
Nicolas de Cordes, Orange

