

# Analysis of Post-Migration Mobility and Social Ties of Internal Migrants

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Migrations have been studied using macro-level and micro-level analysis. Macro-level studies are carried out using a combination of various survey and census datasets to model large-scale behaviors, however these models fail to provide more nuanced information about the physical or social status of the migrants. Micro approaches, which use interviews and diaries to provide a window into more individual behaviors, could benefit from methods to identify novel or under-studied behaviors that should be addressed in the migration research agenda. In this paper, we present a framework that uses information extracted from cell phone metadata to reveal internal migration behaviors that complement micro-level migration approaches working to understand the physical, social and psychological decision processes behind migration. The proposed framework reveals internal migration behaviors with a focus on immediate post-migration behaviors and the role of pre-migration activities from two perspectives: spatial dynamics and social ties. The main objective is to carry out large-scale analyses of internal migration trends to reveal migrant behaviors that would benefit from further qualitative studies through personal interviews or individual surveys. Ultimately, we expect our analyses to inform migration researchers of pre- and post-migration behaviors that would benefit from further qualitative analysis.

Given cell phone metadata from millions of individuals for a given country, the proposed framework consists of three parts. First, the framework uses features extracted from the cell phone metadata to identify potential migrants in the dataset. We present a method to identify internal migrants and we evaluate its accuracy using real census migration data [1]. Second, the framework uses the aggregated migrants to characterize immediate post-migration behaviors i.e., we analyze the post-migration spatial dynamics and social networks and compare these against behaviors from locals that have not undergone any migration process. Third, we analyze the role that pre-migration spatial dynamics and social networks might play in the same post-migration behaviors shown by internal migrants.

We evaluate the proposed framework to study internal migration behaviors in Mexico, using a dataset with eight months of anonymized cell phone metadata from over 48 million subscribers in combination with open data from the Mexican Statistical Institute (INEGI) [3]. In this context, regarding mobility, we observe among other findings, that in the immediate post-migration period, internal migrants, visit more municipalities and have more irregular behaviors than the local community. In fact, immediately after migrating, migrants have, on average, higher entropy than locals, showing more irregular mobility patterns and having significantly longer trips. These findings could reveal that individuals make an effort to maintain their local connections in their pre-migration municipalities either because of work or personal reasons. Similar findings have been qualitatively reported in other countries [4]. Regarding social ties, migrants communicate with a similar volume of calls than locals, but with a smaller number of contacts, and show lower entropy in their cell phone-based social networks than locals. Also in this case, similar results have been shown in the context of international migrations [5].

## References

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