Measuring Global Issue Ownership: A Computational Communication Schema

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Extended Abstract

Introduction

Theorizing global issue ownership Issue ownership, which originated from election studies in the 1980s, refers to the connection between partisan candidates and domestic issues. Parties gain advantages in elections by "owning issues" (Petrocik, 1996). Issue ownership has two analytical dimensions: "competence" and "associative". The former refers to an actor's ability to deal with an issue and its reputation for addressing issues of concern to voters (Walgrave et al., 2012); the latter emphasizes that, over time, voters develop a "taken-for-granted" natural association between party and an issue coming from long-term perceptions (Holian, 2004).

With economic, political, and information globalization, people from different countries developed further interdependency and have more shared concerns – what we call global issues (Hite & Seitz, 2021). These trends are calling for theoretical and methodological exploration of *global* issue ownership – how countries are connected with global issues. Based on research on international news flows (e.g., Guo & Vargo, 2017), we apply the concept of issue ownership to global communication. The following parts provide a brief review of previous measurements and propose a computational schema to better quantify global issue ownership.

Three methodological approaches The first method that is commonly used to measure issue ownership is the survey method, which focuses on an individual's impression of the actor-issue association. For example, Tresch and Feddersen (2019) used questions including "Which party do you think is best at dealing with issue X?" and "When you think of issue X, which party do you spontaneously think of?" Nevertheless, this approach faces the pitfalls that all self-reported surveys have (e.g., low representative and high cost).

With the prevalence of digital media, semantic network analysis is applied on analyzing issue ownership. Scholars operationalize issue ownership as strong ties (i.e., high co-occurrence frequencies) between actors and issues in a semantic network (e.g., Guo & Vargo, 2015). Yet, network analysis has not been widely applied to study ties between countries and issues. The co-occurrence of issues and political subjects also does not directly prove that people have established an association between a country and an issue.

The third approach is word embedding (e.g., Gyllensten & Sahlgren, 2018). This method calculates a similarity index between the language use of online texts and the owner's official claims. This approach, however, is based on an assumption that (1) the actor(s) own strong media outlets and (2) their issue ownership largely depends on the agenda-setting ability of their media. Given the limitations of the existing approaches, we propose the following schema:

Case study We selected global texts around human-computer interaction (HCI) as an example, as it is a relatively neutral and emerging issue that concerns the world. We plan to collect four datasets: Two social media datasets from Twitter and China's Weibo (since Twitter is blocked in China), representing people's perceived issue ownership, and two datasets from English (from Brandwatch) and Chinese news (from Wisers), representing media portray of issue ownership. Our goal is to produce comprehensive, cross-outlets, and continuous indices that can represent both people's perceptions and media portray of the association- and competence-based connections between global issues and countries. We detail the steps below:

Associative issue ownership To measure simple associations between countries and issues in a specific document, first, we split each document into words to build a corpus. Second, we build word2vec (Mikolov et al., 2013) on the corpus to calculate word-level embeddings using *gensim-word2vec* (Rehurek & Sojka, 2010). Word2vec trains the word vector representation by considering its context information jointly. Third, after obtaining the embedding, cosine

similarity, and Euclidean distance between the representation of a predefined document topic and target country are calculated as the representation space distance, aiming to represent the semantic relation between the words. We then construct a representative word list for each topic ranked by vector similarity of its corresponding associated words. The topic word list is used to filter the dataset to obtain articles with a higher degree of association with the topic as the dataset. These steps are applied to both social media and news.

Competence issue ownership Competence issue ownership, as a compound concept, has a more complex annotation. Based on previous literature (Petrocik, 1996; Walgrave, Tresch & Lefevere, 2015), we first develop a 2×2 typology to measure (see Figure 1). Based on this typology, we classify each document on two criteria: current ability and future tendency of contribution. Since the criteria are not explicit and require in-depth document-level understanding, we create manual annotations and train a deep-learning model. First, we conduct preprocessing steps including replacing emotions and emojis with texts, removing usernames and hashtags, tokenizing, etc. Second, to handle long input sequences, we split the documents into overlapping passages that are less than 512 tokens and later apply the pooling method on passage hidden states, following Dai and Callan (2019). Third, we adopt RoBARTa (Liu et al., 2019), a pre-trained model to output passage hidden states. The model selection is due to RoBARTa's excellent performance in understanding longer sequences. Fourth, we finetune the model to classify the hidden state into corresponding score labels. After training, unlabeled documents are rated by the model producing classification results and confidence, which are used as weights to measure country competence across the corpus under the topic. Similarly, the same measurements will be applied to both types of datasets.

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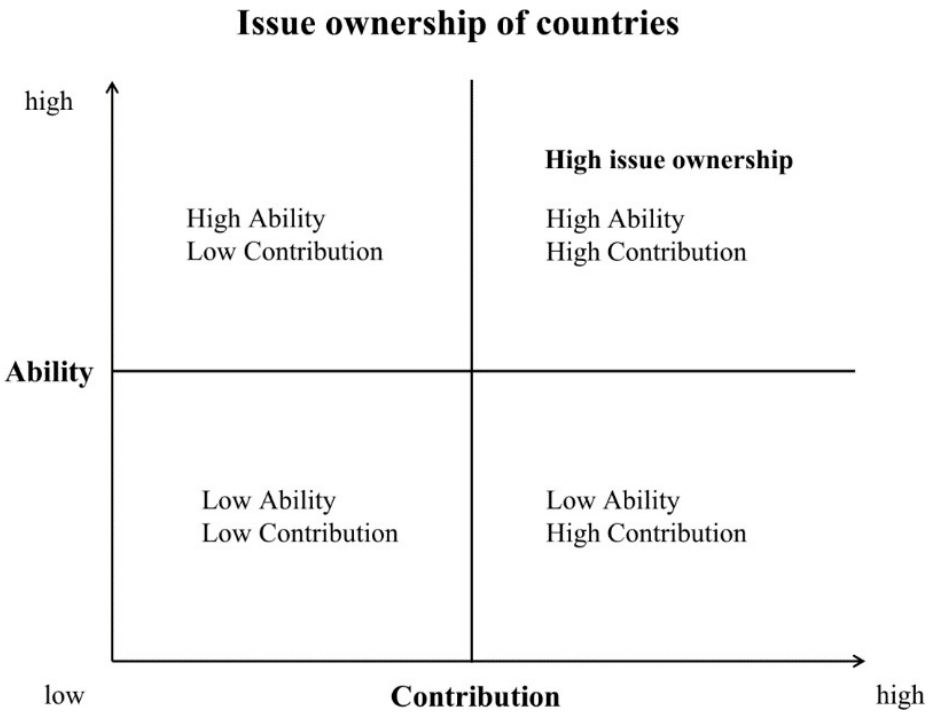

Figure 1. 2×2 Measurement of Competence Issue Ownership

Note. A country is considered competent when it showed both high ability and contribution (i.e., willingness to tackle the issue) in an area.