Design, Machine Learning, and the City: Borrowing Memories to Understand Urban Space

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[AI]STANBUL: EDUCATING A VIRTUAL NATIVE

How does one learn about a place, a city when you move there, visit it, or live in it? *[AI]stanbul* is a project that is the result of this simple question.

The project has been designed to incorporate digital technologies to understand our connection, as humans, with "place" by utilizing interactive tools. *[AI]stanbul* has been designed as a curious machine that aims to become a "virtual native." In a broader sense, the project tackles the question "how can we teach our city to a machine?" Here, I discuss what the "machine" learned after an experiment on the utilization of the urban space and seek the ways what we can learn back from what "machine" learned from city dwellers and the way *[AI]stanbul* processed collected data as well as the ethical aspects of the process.

THE PROJECT

[AI]stanbul is a computational installation[1] composed of two screens, each of which is directly connected to a live database that processes the collected data simultaneously: interactive screen and the blackboard.

The interactive touchscreen (Figure 3 and 4) aims to engage in an informal dialogue with the visitors. Not being interested in who they really are, it tries to understand how individuals articulate themselves to the constant dynamism of the urban environment by asking them simple and place-based questions, such as where they ate their last meal or how they got there. It acquires and appropriates place-based experiences through interactions with visitors/participants.

The conversations take the form of both natural language and image-based interactions all of which are tied to an Istanbul map. The interface is created in the gaming engine Unity. The questions appear as texts on the touch-screen that can be answered by selecting options from pull-down menus or by simply touching a point on the map. Geolocated answers are processed in the database that refreshes the map constantly.

Visitors can skip any question, "misinform" the machine, or end the session anytime they like. Answers of the visitors are meant to train the machine, they are not a part of a questionnaire or a survey.

The other component of the installation, the blackboard, is a second screen placed on the opposite side of the interactive screen (Figure 5, 6, 7 and 8). The data collected from the responses of the participants are processed simultaneously and visualized on this screen. This means that visitors can see their responses in real-time when they move to this screen giving them the chance to see and experience how their responses reshape the data visualization. Geolocated everyday movement is processed and mapped by the blackboard through a number of modes: for instance, one mode maps the data points by categorizing them as color-coded nodes, representing home, work, food, and activities. Another mode visualizes the daily movement of each user in the city by drawing trajectories on the map.

URBAN DATA

During the time it was on display at the 4th Istanbul Design Biennial, *[AI]stanbul* had been trained by locals with more than 7000 entries in a month and a half. On the one hand, *[AI]stanbul* is designed to become more intelligent with this data as more visitors share their memories, daily experiences, and practical information about the city. It then visualizes the urban experiences of its users by absorbing their daily routines about transportation, design, places to eat or visit in Istanbul. On the other hand, the memories, which *[AI]stanbul* "borrows" from its users and turns into data, form the basis of the machine learning algorithm that can be used for understanding global cross-experiences and hybrid permutations in different cities.

One of the biggest challenges that *[AI]stanbul* had to deal with was linking the "memory/data" to location as this was related to the topological division of the city. At the beginning of the design process, a need to define what a district/region means, what determines a neighborhood, how it is distinguished from its surroundings emerged. These topological divisions could only be used as the base for the collected information and machine learning if they were defined as computer code.

Figure 1. *[AI]stanbul*'s interface.

Figure 2. *[AI]stanbul* is on display at C-Mine, Genk, Belgium. Photo: Burçak Özlüdil.

PROJECT

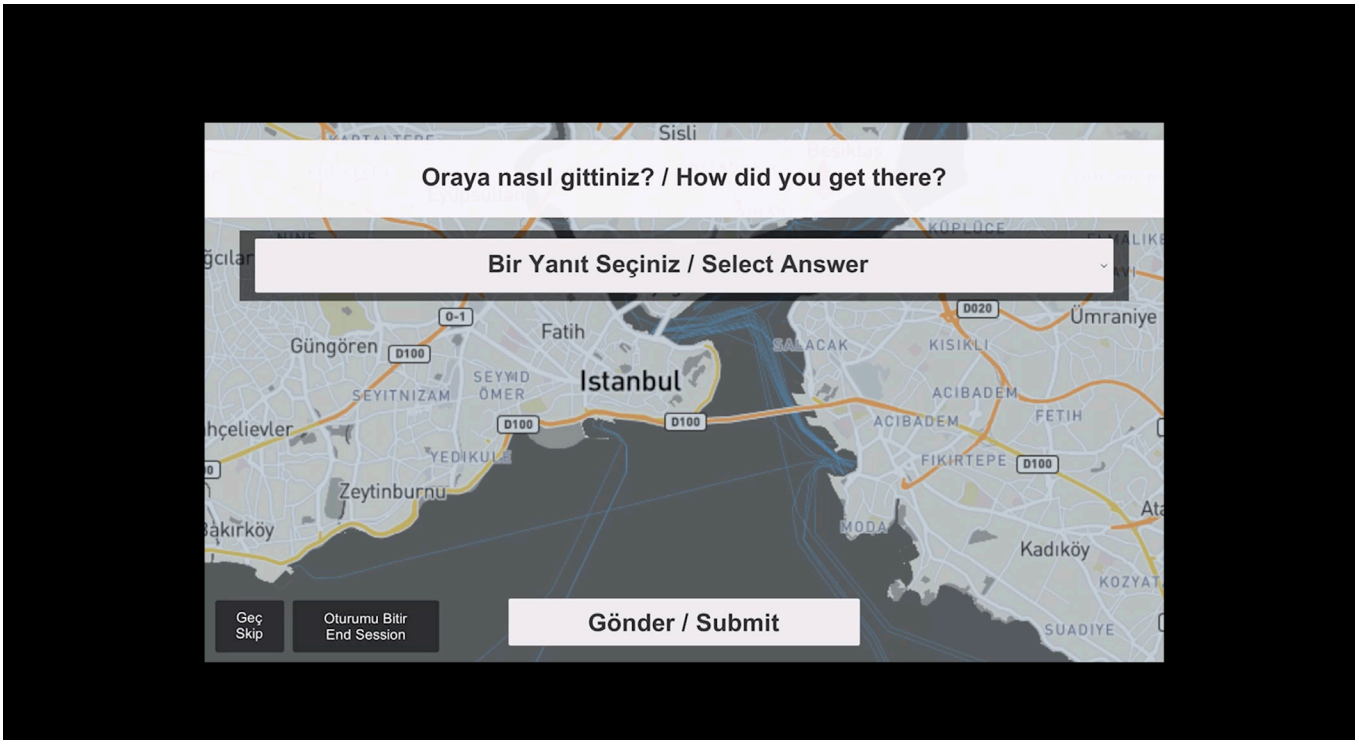

Figure 3. *[AI]stanbul*'s interactive touch-screen.

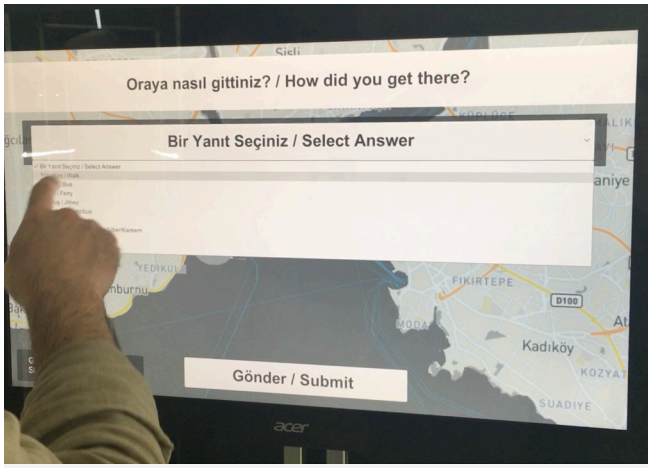

Figure 4. Interacting with *[AI]stanbul*. Photo: Burçak Özlüdil.

MACHINE LEARNING

[AI]stanbul's blackboard is not interested in the statistical data that show how many people do what and where. Rather, the aim is to understand how urban space is experienced through constant replacement. Some of the modes of the blackboard reveal the working principle of machine learning algorithms.

[AI]stanbul's artificial intelligence processes the gathered data by utilizing Principal Component Analysis (PCA) and Markov models. While PCA is utilized to analyze and process the answers of the participants which essentially are represented as data points on the Istanbul map, Markov models are used to recognize patterns of the movement and to predict possible next steps. In the final mode after each user interaction, *[AI]stanbul* draws new trajectories, produce new routines and stories based on the memories it borrows from the participants.

[AI]stanbul builds itself on a quite sophisticated technological foundation however it does not attempt to impose a novel technology nor to praise contemporary digital tools that made *[AI]stanbul* possible in the first place. This is also crucial in making this project appealing for potential participants. A related challenge is to define and execute this project not as a platform such as Yelp or TripAdvisor that tries to capture the flashy, the new, and hot destination, or that favors reviews, stars, and likes. This is a format we are all very used to.

[AI]stanbul is not imagined as an app therefore it does not intend to integrate itself to the smart devices that we already have taken for granted. It openly asks people to train it: a completely anonymous but very ambitious teacher-student relationship.

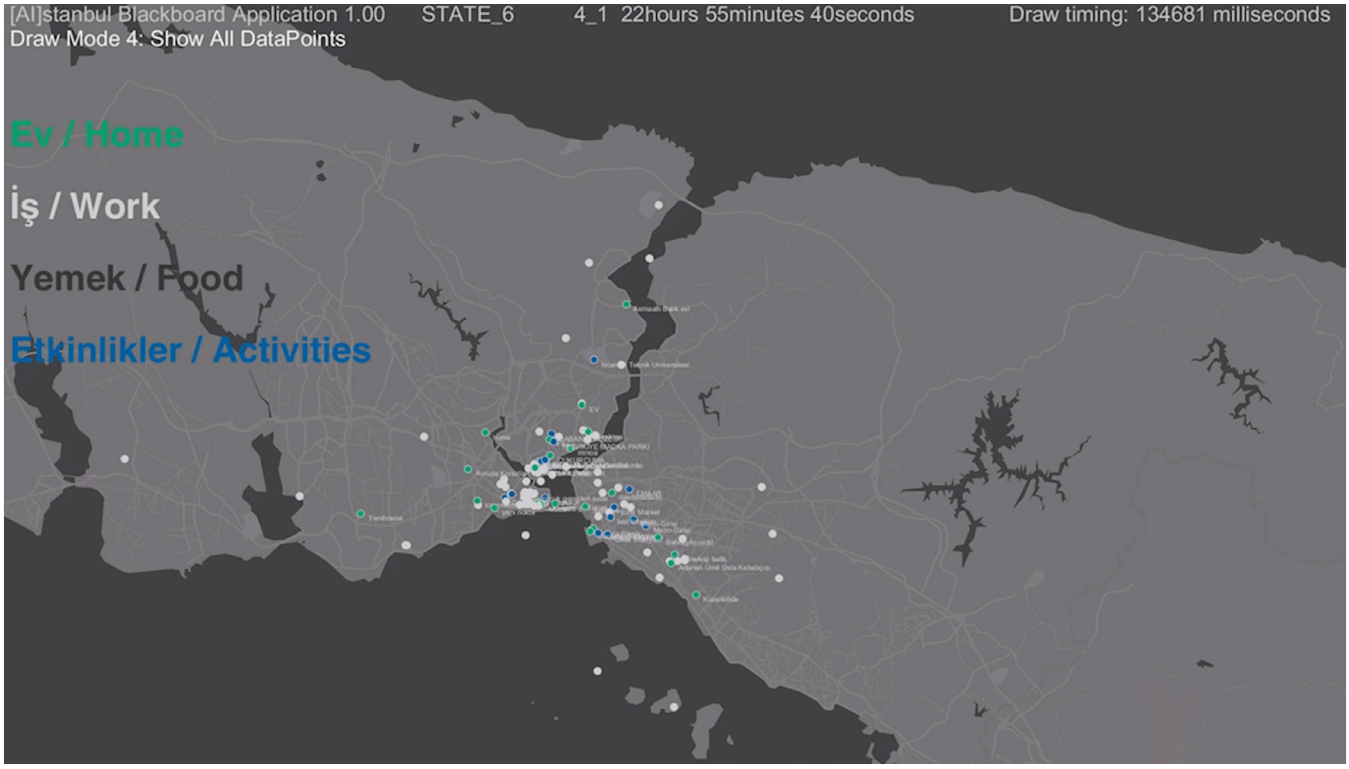

Figure 5. *[AI]stanbul*'s blackboard: modes.

Figure 6. *[AI]stanbul*'s blackboard: trajectories.

PROJECT

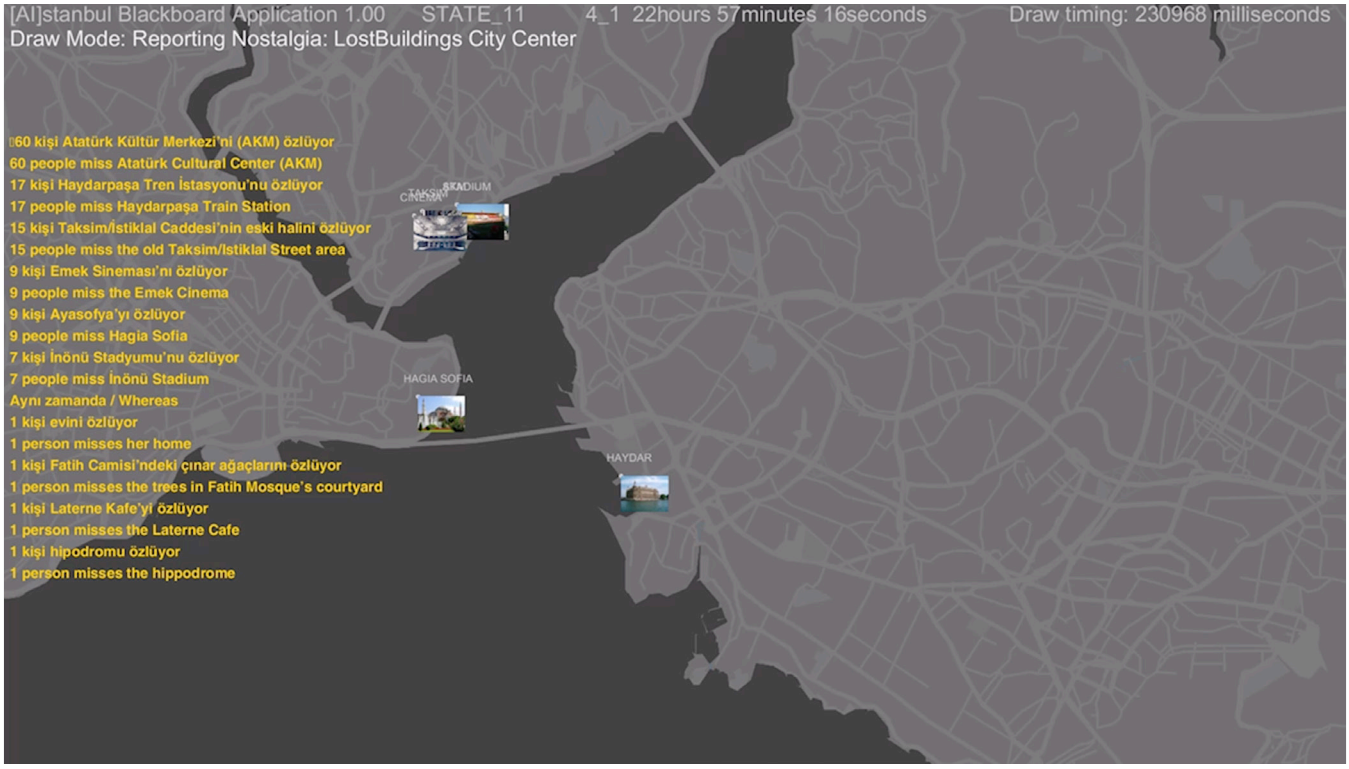

Figure 7. *[AI]stanbul*'s blackboard: Wishbox.

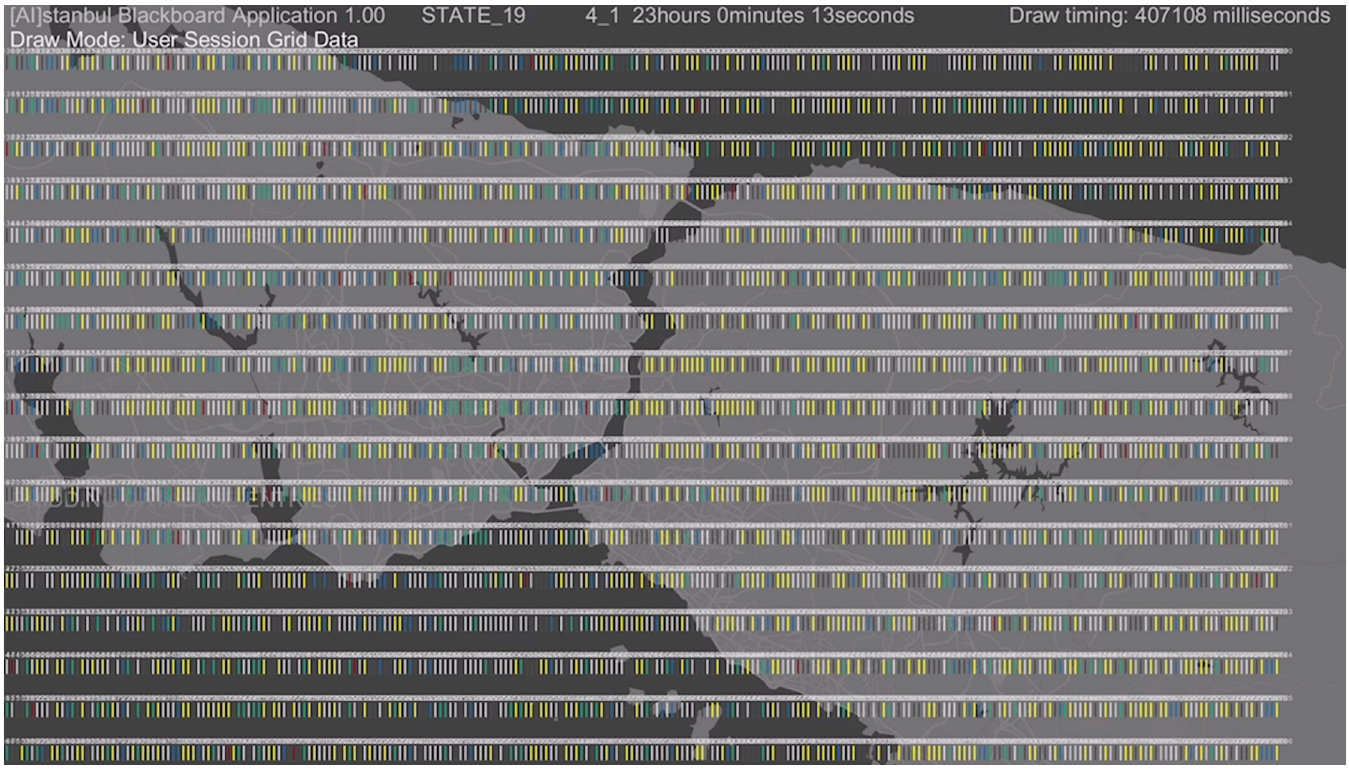

Figure 8. *[AI]stanbul*'s blackboard: user session data.

Figure 9. *[AI]stanbul* is on display at Akbank Sanat,Istanbul.

Figure 10. *[AI]stanbul* is on display at Akbank Sanat,Istanbul.

Participants, as liberated from merit-based expectation, teach *[AI]stanbul* Istanbul so they find themselves in a sort of interaction out of their comfort zones. It is an interaction where roles of learner and teacher change constantly.

NEXT

[AI]stanbul was designed as a process; it is scalable, and can be adapted to other cities. It is a project with no end date as cities are dynamic and they can be a source for never-ending learning of their urban dynamics. It is an experiment on the ways in which we experience cities. It does not define/design a new medium, nor a model that praises AI technologies but seeks possible ways to think with artificial intelligence. Rather than being a matter of statistical data for the APIs of big tech companies, search engines, social platforms, *[AI]stanbul* proposes a private and sincere interaction that takes urban space at its center.

[AI]stanbul is trying to capture our ephemeral relationship with the city and its places; those maybe we do not talk about or share, but make up the lion share of our lives: our simple routines, that cafe across the street you grab your pastry in the morning, but without forgetting those that “spice up” our life every now and then. And doing this by keeping the proportion between the mundane and the extraordinary.

ENDNOTES

1. *[AI]stanbul* was developed by a team. Team members that developed the version introduced here: Ersin Altin, Burçak Özlüdil, Augustus Wendell and Amy K. Hoover. Students Garry Guann (computer science) and Satchel Quinn (information technology) supported the team with the development of *[AI]stanbul’s* interactive applications.