Title: *BTW: if you go, my advice to you*

Abstract

We ask teams to consider a route-planning system that allows community input. Imagine planning a trip in an unfamiliar city, and having the advice of those who live in the city at your disposal. Once you have a route you think looks reasonable, you can ask to see what others have to say about that route. Perhaps some have positive things to offer: the route is fully wheel-chair accessible; there are plenty of public restrooms along the route; street crossings are all reasonable. Some may have warnings to pass along: certain parts of the route can be dangerous at night; construction along one block forces a detour; a specific crossing has quick-changing signals. As you can see, advice might need to be filtered: the traveller may not want to see all advice about the route being considered, but instead filter that advice to match his or her abilities and preferences. In summary, the system, which we call BTW, is an attempt to move beyond the official GIS information that might be provided by a government or private agency, and allow the travelling public to provide advice.

Introduction

We believe that the individuals who live and travel in a city can be a fountain of useful information. Not only can they recommend hotels, tours and restaurants (e.g., see www.tripadvisor.com), they can provide detailed information about the highways and byways of a community. We would like you to build a system that will allow the travelling public to add their advice to a route-planning knowledge base. This knowledge base can be accessed when someone is planning a trip. Once a proposed route is obtained, the advice of others can be seen as it pertains to the specific route and to the specific person. The basic functionality of the system is as follows:

1. *Entry of a profile*. People giving advice are asked to give profile information. Travellers seeking advice will also be asked for profile information.
2. *Entry of advice*. A person can enter information about a specific geographical area. The area might be a GPS coordinate, all or a portion of a sidewalk, an entire street, or a circumscribed area such as a set of blocks or a park. A person can enter information about public transportation including specific routes or stops. Advice can have a temporal component such as "this area after dark", "this route during rush hour", or "this stop when an event at the arena". Advice format can be multi-media, including text, pictures, video, audio.
3. *Route-finding*. A traveller will ask for a route from point a to point b. It is expected that the trip between a and b will be a reasonable one in terms of walking and using mass transit. A route will be returned.
4. *Advice-giving*. Once a traveller has a route, he or she can ask for pertinent advice on the route. The BTW system will use its knowledge base of advice to retrieve relevant information for the specific route. The system will further filter this information based on the profiles of the traveller and the advice giver.

What would be nice, but we are not asking for, is a route-finding subsystem (#3) that actually took advice (#4) into account. The model above is one of generate and test: generate a somewhat non-personalized route; then see if you like it once advice has been shown. If we moved the advice component into the generator, we could be presented with only routes that passed muster. However, we view that as beyond the scope of this project. We encourage teams to use whatever publically available route-finders they like. The challenge is to overlay pertinent advice onto the routes returned.

Application domain and scenarios

The application domain of the BTW system is travel by the use of walking and public transportation in an area where route-finding tools can produce a candidate route between two points. This project focuses on advice about a specific route; it is up to the traveller/user to decide how to use the advice to modify a route (if at all).

The BTW system, we believe, can be useful to a wide range of the travelling public. Hence, we do **not** prescribe that a student team must work with specific user groups. However, as part of our own research, we have been looking at portions of the travelling population that are underserved by the route-finding tools in existence today. These include: those that have challenges with mobility, physical fitness, and medical conditions that relate to travel; those that have visual impairments; those that have cognitive impairments. In the section below, we will list some of the issues that we have turned up by talking with both travellers and professional staff that support community travel. We expect that teams will fill these examples out with ones of their own as they work with real stakeholders.

Examples:

[Ex1]   Traffic signals give a pedestrian a certain time to safely cross a street. This time may be inadequate for some people, leaving them in the street as the light changes. Some intersections may have no traffic control, making a crossing a hazardous ordeal. Some intersections, even with traffic control, seem inherently dangerous when viewed by reported injuries to pedestrians. All of these require that intersections be flagable with advice.

[Ex2]   Some streets may be in disrepair, making pedestrian travel difficult for those with mobility problems. Construction areas often offer similar hazards. This requires that portions of a sidewalk be flagable. And by inference, that the sidewalks on both sides of a street be separately flagable.

[Ex3]   Some users may wish to be in proximity (time or distance) of public restrooms at all times during a trip. There are two ways to look at this: (1) a section of a route can be marked negatively as lacking public restrooms, or (2) the public restrooms in the community can be marked (and by inference, the positive routes that intersect them). The same can be said for other types of public conveniences, e.g., public drinking fountains, places that will cash a check.

[Ex4]   A user may wish to avoid certain areas for safety reasons. This may be at all times, or only during certain times during day or night. Requires that entire regions be flagable.

[Ex5]   A user may wish to avoid a bus route, e.g., because it is difficult to get on or off quickly enough. Requires that public transit routes be flagable.

[Ex6]   A certain transit stop may not have adequate protection from the weather. Requires that individual stops by flagable.

Project goals (requirements)

The functional goals are as follows:

F1. Acquire the personal needs and preferences of someone who wishes to **get** advice about route-planning. We would like teams to focus on route-finding as it pertains to walking and use of public transportation within a community. We expect preferences to generally focus on route and travel preferences. However, we do not rule out preferences on the actual advice process itself, e.g., what advice givers they prefer.

F2. Acquire the personal needs and preferences of someone who wishes to **give** advice about route-planning.

F3. Accept advice about the routes within an area. What area? We suggest that a team work with an existing route-finding tool. This means that they will need to work within an area covered by that tool. However, we do not rule out a team writing their own route-finding tool for an

area they prefer, e.g., their own community if not covered by an existing tool. But of course, building a route-finding tool can be a separate project, in itself, and makes the BTW project more than a mashup. Advice should have a multi-media format, allowing combinations of text, pictures, graphics, audio or video.

F4. When a user gets a route from a route-finding tool, advice will be registered to the route. This advice will be pertinent in two ways: (1) it is advice that pertains to the route at hand, and (2) it is advice that matches the needs and preferences of the user.

The non-functional goals are as follows:

N1. If advice is difficult to give, it limits the amount of information that can be collected. Teams should consider the easiest way for advice givers to provide information. The easiest would be by monitoring the advice giver as he or she travels and allow on-the-fly information to be captured by a cellphone (audio, image, video). Teams may want to look up work in the area of geocoding.

N2. If advice is difficult to understand, BTW will not attract a large advice-seeking user base. A straightforward presentation style is the candidate route with a BTW overlay that is easy to read: the advice becomes part of the overall route.

N3. We encourage teams to use existing route-finding and GIS services as a foundation. In this light, the BTW project can be viewed more as a mash-up than a build-it-from-scratch endeavour.

Testing and evaluation

Testing and evaluation is predicated on a strong requirements elicitation effort. We would urge a team to rely not on their own intuitions about what is useful community travel advice, but instead to work directly with potential users of the BTW tool. If a team uses an agile methodology, for instance, this means identifying stakeholders early and getting their feedback on the multiple prototypes produced. We can provide two extremes in the evaluation effort. In the worst case, a team builds what they think is useful and test it out on themselves. If there are no bugs, then it passes their evaluation. In the best case, a team works with a target user group that fits the BTW model: people who are interested in making (or advising about) walking and public transportation trips in a community. They endorse prototypes as they are produced; they may even participate in prototype design. The final evaluation is with new users in realistic settings. For instance, identifying people who normally use a route-finder tool X and now asking them to evaluate the advice they get overlaid with the output of X. If one believes that BTW is a type of community-based recommender system, which we do, then these papers may help teams think about evaluation issues.

http://web.engr.oregonstate.edu/~herlock/papers/eval_tois.pdf
https://www.cs.tcd.ie/publications/tech-reports/reports.02/TCD-CS-2002-19.pdf

Intended output of the process (process focus)

We are interested in four deliverables:

1. A pilot system that is web-based and can be demonstrated. The student team is free to choose a specific community/city (for instance, their own) to ground the demonstration. They can have real or simulated advice items in the knowledge base. They can have real or simulated traveller profiles. For the first report due, teams can use screenshots to illustrate their system.

2. A simple architectural diagram. As an example, see figure 1 in this paper by Thang et al: http://www.go-outside.org/BTW/thang-etal.pdf.

3. The evaluation process used to determine if the system meets real needs. What use cases, usage scenarios, user stories came out of the teams' interaction with stakeholders? How was

the final system shown to meet stakeholders' needs? See the discussion above on testing and evaluation.

4. Any insights the team gained in "mashup engineering". We expect teams to build on whatever tools they can find. Does building a mashup in this way differ from the concepts taught in software engineering classes today?

Tools and standards

We are tempted to list the many tools we are aware of that might impinge on the BTW project. However, the mapping/GIS tool landscape changes so quickly that the list will soon be outdated. We expect teams to be able to do their own research and make their own decisions about what tools the team can use effectively and what tools are just too much work to bend to the team's needs.

Interaction between stakeholder and developing teams

The contact person for the BTW project is Stephen Fickas (fickas@cs.uoregon.edu). He is part of a research group that is studying ways to make a community more accessible by all. Route planning is one of the key components of accessibility. Fickas' group has just completed a larger study of the many steps that must be (successfully) carried out to complete a trip. They fit these steps into a model called Activities of Community Travel (or ACTS for short). Professor Fickas can provide a student team with an overview of ACTS that might be helpful when thinking about the obstacles of a successful trip.

A project web site will be maintained at www.go-outside.org/BTW. Teams will find late breaking news there.

Contraindications

This project may not be suitable for all. If a team cannot find real stakeholders, and employ those stakeholders in an effective fashion, then a large portion of project points will be lost. Who are real stakeholders? For this project, those who actually do community travel by foot and/or by public transportation. Some of who enjoy providing their own experience as advice to others. Some of who appreciate getting advice that may not be available by other means.