

Tree Failure Prediction for Storm Preparation and Response

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Problem: Research has shown that trees growing in urban areas provide a wide array of environmental, social, and economic benefits. These benefits increase as a tree grows in size and may not peak for several decades after planting. Unfortunately, as trees mature the potential risk they pose to nearby targets, should they fail, is also increased.



When deciding whether or not a tree needs to be removed, the public relies on arborists and urban foresters to help them weigh these benefits and risks. However, tree care professionals have few resources to effectively quantify failure potential. Past attempts at gauging the likelihood of tree failure have largely been isolated as individual site- or region-specific studies with no comprehensive analysis or synthesis of data between projects. Arborists' decisions regarding tree risk are thus limited, leaving much to qualitative assessment methods and personal experience. Research has shown that personal bias is the main factor influencing a professional's decision

regarding the safety of a given tree, setting the stage for both premature removal (i.e. lost benefit) and ill-advised retention (i.e. unacceptable risk).

Solution: The majority of tree failures occur during extreme weather events. As such, tree risk assessment is closely related to storm failure prediction. With violent weather events becoming more common, so are potential sources of data which can be applied in predictive models. Hurricane Sandy alone resulted in the removal of tens of thousands of urban trees. These losses occurred in an area of the United States where urban trees are often actively managed and inventoried.

By partnering with the New York City Parks Department and tree management agencies, we are working to develop tree risk assessment and debris estimation models that serve as the basis for a suite of mobile apps. While these tools will meet an immediate need of arborists, the applications will also (with permission) gather the data needed to constantly cross-validate and update our original models. This dynamic approach to tree risk assessment research offers both short- and long-term benefits which are needed to sustain a large-scale, long-term study.

Project Deliverables: We are currently seeking NUCFAC support through the United States Forest Service to create a storm preparation and response toolkit. Current deliverables for this project include:

- An online/mobile tree failure prediction application
- Integration with existing debris estimation models (i-Tree Storm) and storm response efforts (USDA FS Strike Teams)
- Storm preparation and response Best Management Practice

- User manuals and video/webinar training
- Online, open access user database (ITFD)
- Internship program to implement program use in 3 North American Cities

We are also seeking additional partners to advance these efforts. **This includes natural resource management agencies/municipalities with storm failure data which can serve as the initial training model.** Please contact Andrew Koeser at akoeser@ufl.edu for more information.

Picture source: <http://www.bbg.gov/>

