Digital Triage Assistant

David Calvo, Jonathan Edwards, Bella Ferrara, Sean Glaister, Geno Go, Vara Mathiyalakan

Johns Hopkins University | Whiting School of Engineering | Baltimore, MD
Design Day 2021

Introduction

The *Digital Triage Assistant* (**DTA**) includes the implementation of wearables, (similar to commercial devices such as FitBits, Apple Watches, etc.), on soldiers that can measure key health vitals. Additionally, the Digital Triage Assistant includes an algorithm that takes in inputs such as the soldiers' health vitals, medic observations, and past medical history, and quickly outputs a quantitative measure of the severity of the soldier's injury, known as the "mortality likelihood score." This output would then be utilized by an attending medic on the frontline to better treat a wounded soldier. In terms of practical applications, the utility of these systems is especially beneficial to medics attending mass-casualty or civilian-casualty incidents in which a medic needs to know which injured person to treat first.

Background

In the midst of a multiple- or mass-casualty event, decisions and judgments must be made in split-seconds to save lives. One such decision process is triage: the assessment of wound or illness severity to decide the order of treatment when there is a large number of patients or casualties. Whether it be governments, NGOs, or international institutions, all such actors rely on the power of triage to make sure that when calamity strikes, as many lives can be saved as possible.

Current Work

Earlier in the Fall 2020, the JHU team partnered with the Czech Technical University in Prague to onboard the necessary expertise to design and code the DTA prototype. The partnership has flourished with our Czech counterparts actively developing the DTA backend, preparing a demonstration, and garnering official support from the Czech Armed Forces. The JHU team has supported these efforts through project oversight, interviewing of medical and military experts, and continued efforts on conceptualizing the predictive capabilities of the DTA.

The DTA

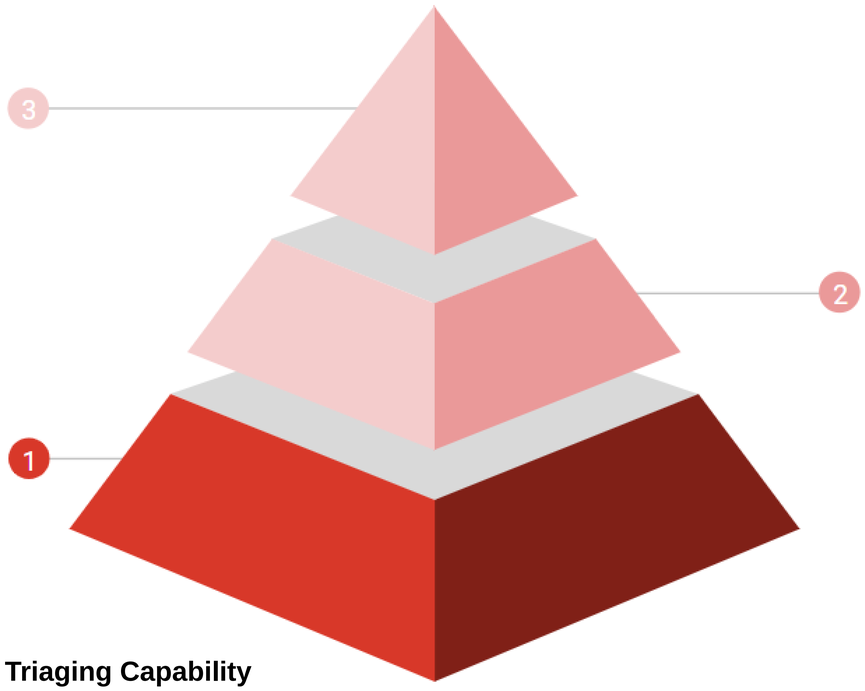
AI Triage with datasets

Use machine learning to perform multivariate analysis on vital parameters and inform MLS predictions using datasets and patient's medical history.

Stretch: Capable of continuous learning.

Digitalization of existing triage algorithms

Use exclusively live data from the point of injury to triage the wounded according to existing triage algorithms, which have absolute cutoffs, distinct severity levels, and can act as a baseline.



Linear/polynomial regression with dataset

Use live data and a linear/polynomial regression model to develop custom heuristics for estimating severity of injury and outputting an MLS.

Note: At this level, we still only perform univariate analysis (one parameter at a time)

Figure 1—Current and Projected Triaging Capability

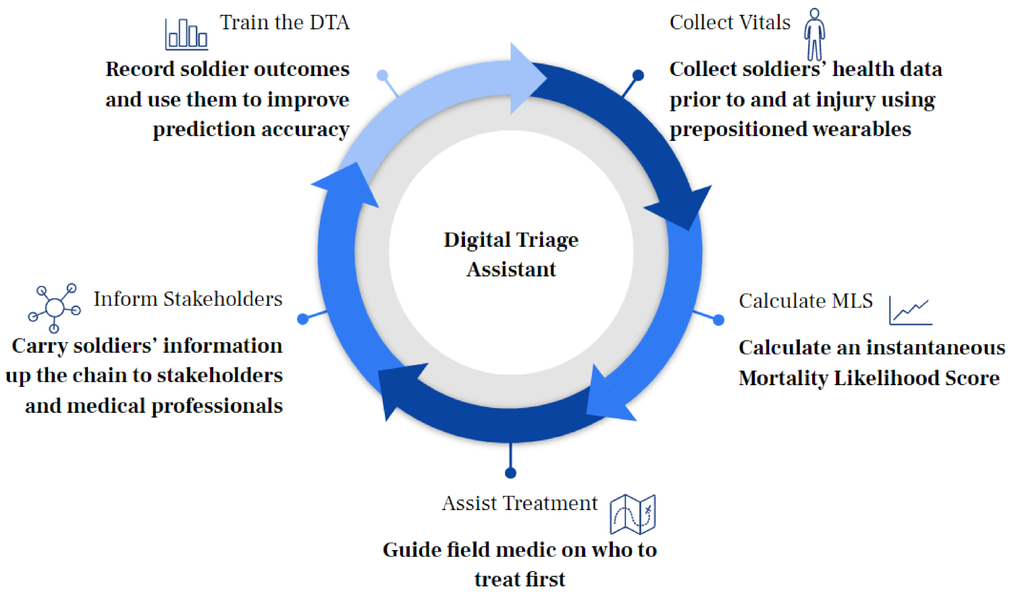


Figure 2—The Continuous DTA Process

Next Steps

The immediate next steps for the DTA project include testing and finalizing the wearable suite and its ergonomics; implementing the simplest, most direct digitalization of current triage algorithms; creating a predictive model to inform triaging; and designing the communication between the components of the DTA while overcoming emergent barriers.

Partnerships

We would like to thank students and faculty from the Czech Technical University in Prague for their collaboration on the Digital Triage Assistant.

We would also like to thank the North Atlantic Treaty Organization (NATO) sponsors of this project, Col. Sohrab Dalal and Col. Julien Viant.