

Predicting Decisions at the Board of Veterans' Appeals

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The Problem

Roughly 167,000 veterans disagree with the government's decision to deny them benefits every year.

The existing process for detecting error depends on **judicial appeals**. But these are costly and incredibly time consuming: on average, the Government takes **three years** to issue a *preliminary* decision. Once a case is appealed, it takes on average **five additional years** to finally resolve.

Can we use machine learning tools to predict erroneous decisions immediately after they are made?

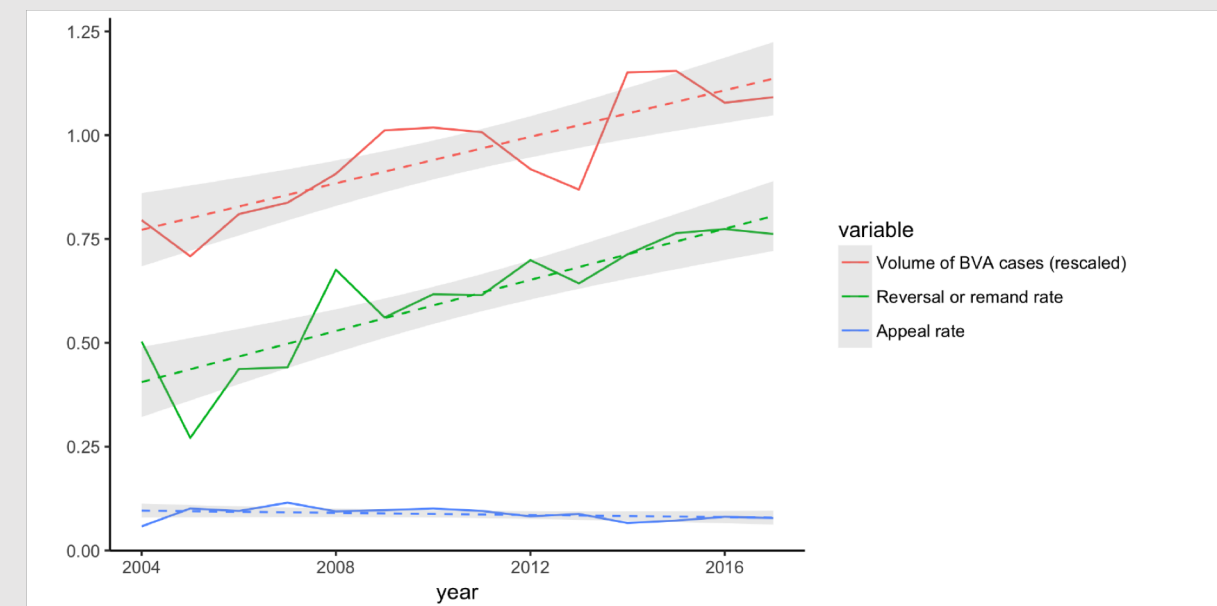
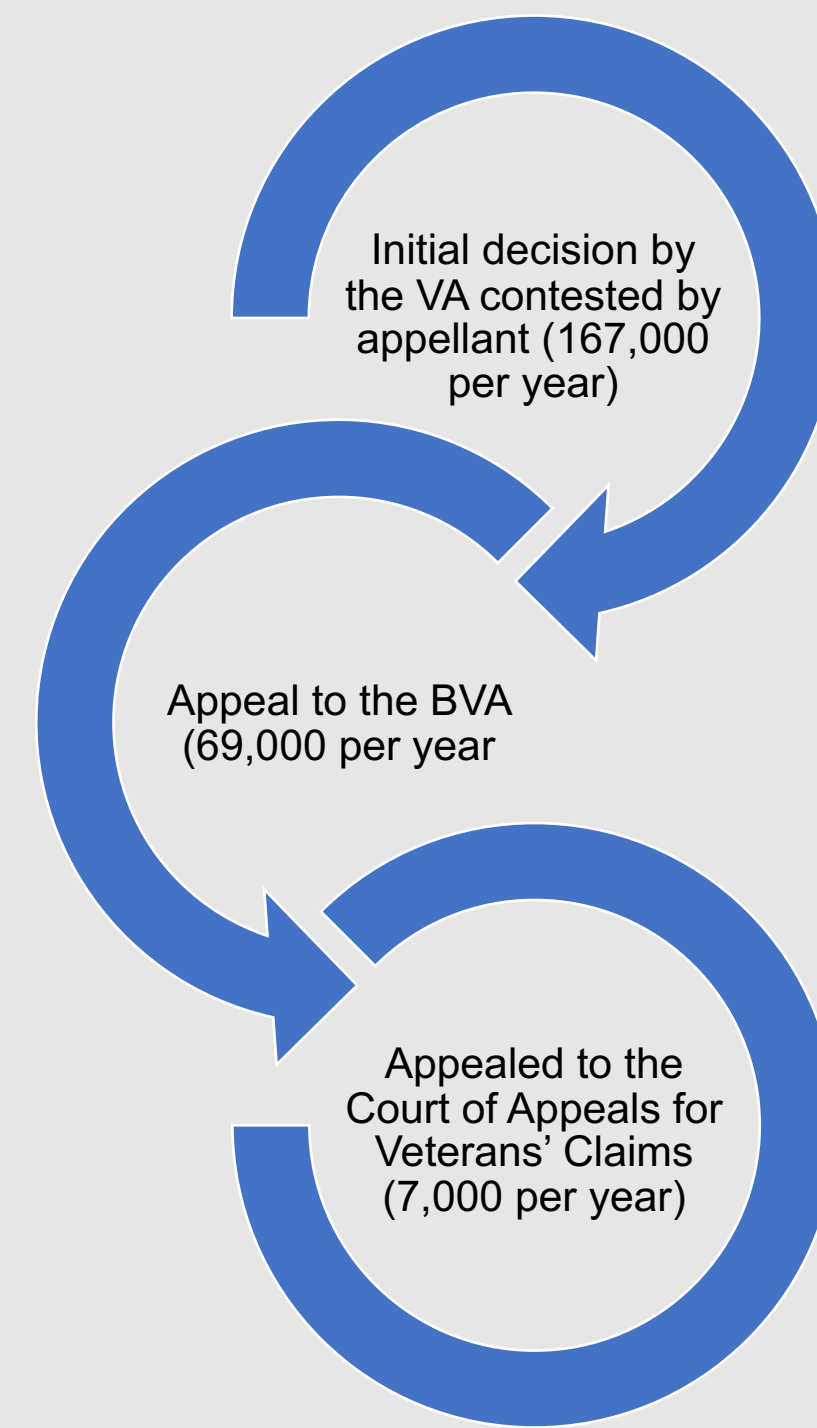


Fig. 1 Rising Case Volumes mean that the BVA processes ~14% more cases today than it did ten years ago. This only contributes to delay.

The Data

287,680 BVA opinions

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Citation No: 1233057
Decision Date: 09/25/12  Archive Date: 10/01/12
DOCKET NO. 09-01 558  )  DATE
)
)
On appeal from the
Department of Veterans Affairs Regional Office in Roanoke, Virginia

THE ISSUES
1. Entitlement to service connection for a right hip disability, claimed as secondary to service-connected disabilities.
2. Entitlement to an increased disability rating for service-connected rheumatoid arthritis of the left knee, currently evaluated as 10 percent disabling.
3. Entitlement to an increased disability rating for service-connected arthritis of the left hip, currently evaluated as 10 percent disabling.
4. Entitlement to a total disability rating due to individual unemployability due to service-connected disability (TDIU).

REPRESENTATION
Veteran represented by: Jeany Mark, Attorney at Law
ATTORNEY FOR THE BOARD
E. S. Markley, Counsel
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Each with an appeal disposition:

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Designated for electronic publication only
UNITED STATES COURT OF APPEALS FOR VETERANS CLAIMS

No. 18-0307
RASHID A. EL MALIK, APPELLANT,
v.
ROBERT L. WELKE,
SECRETARY OF VETERANS AFFAIRS, APPELLEE.

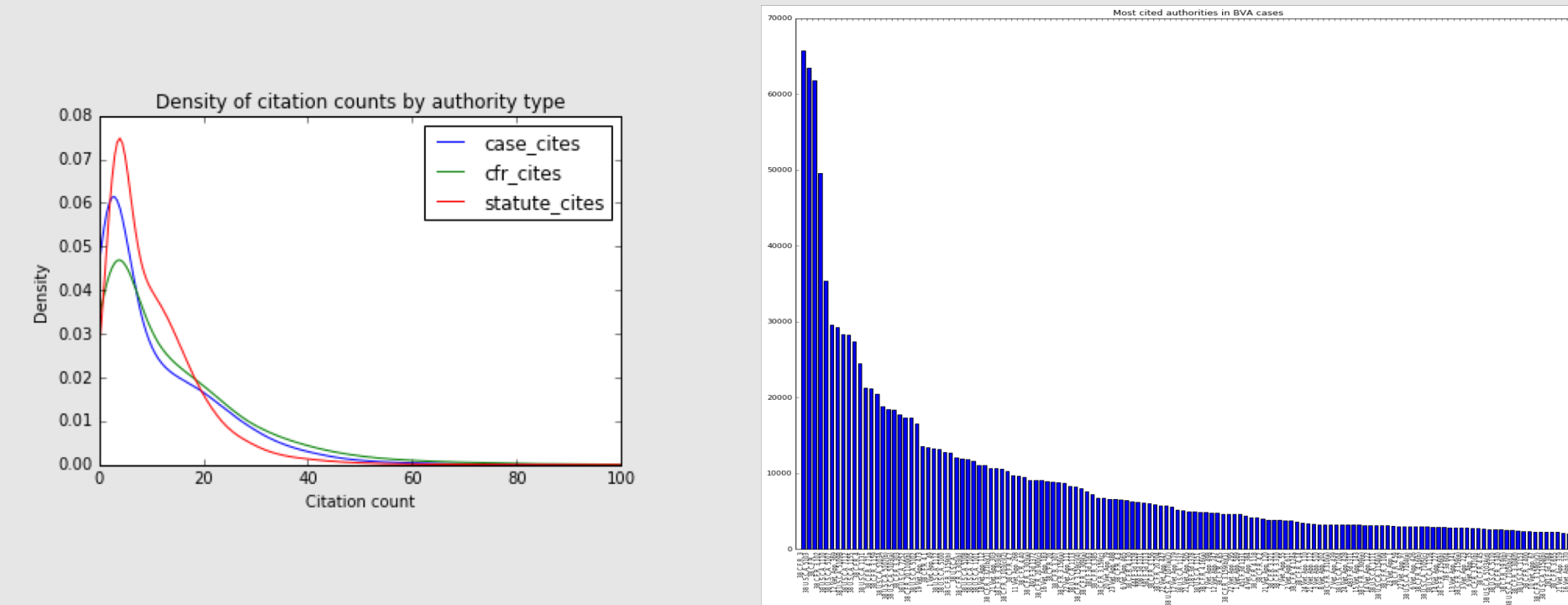
Before: TOTU, Judge.

MEMORANDUM DECISION

Note: Pursuant to U.S. Vet. App. R. 38(a),
this action may not be cited as precedent.

TOTU, Judge: The Board granted veteran Rashid A. El Malik a clothing allowance for year 2014 based on the use of bilateral wrist braces. However, it denied a clothing allowance for the same year based on the use of a special cream to treat bilateral wrist disabilities. He appeals this denial, principally arguing that it is inconsistent with the relevant statute. Because the statute
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Exploring the Data



Some proxy measures for quality vary dramatically across decisions, like the number of legal citations per opinion (a measure of the care with which a judge is justifying her reasoning).

Also, decisions seem to vary on other substantive grounds, like the length of decisions that are appealed vs. not appealed..

	Not Appealed	Not remanded	Remanded
Mean # of Issues	1.95	2.03	2.25
# of Words Referencing Death	0.63	1.24	1.22
Decision Length	7,747	13,377	15,733
Length of Reasons	7,383	10,685	12,824
Mention of Witnesses	61.31%	55.03%	62.66%

Approach

An initial goal of this project was to determine whether standard tools for classification could work well on legal data.

I used 100-dimensional GloVe embeddings to capture the first 2000 words of every document. I then fed these tensors into a series of classifiers based upon the following well-known gold standard models:

- AlexNet
- GoogLeNet (Simplified to just one inception layer)
- A simple 1-layer CNN

I also implemented a version of layer-wise relevance propagation (LRP) to more helpfully capture the impact of individual words on outcomes.

Results

	F1	Accuracy
AlexNet	0.16	0.93
GoogLeNet	0.15	0.91
Simple Classifier	0.16	0.92

