MONASH University

Statistical Election Audits: Bayesian Tests, Optimal Intersection Tests and Tools for Practice

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1 Election Auditing

1.1 Why?

After reported outcome released, need to verify truth

1.2 How?

If every vote is (reliably) recorded somewhere, we can just recount using these records.

But these records are often physical paper records, e.g., paper ballots or voter-verifiable paper records.

Checking every single ballot is expensive for large scale elections.

1.3 Statistical audits

If we can sample ballots *at random*, we can use statistical methods to ensure that an incorrect reported outcome is detected with high probability.

Statistical audits which correct an incorrect outcome with probability of at least 1-α are called "risk-limiting" audits (RLAs).

Use hypothesis tests, but this is a good application of sequential hypothesis testing.

1.4 Ballot-polling audits

The simplest framework for statistical audits.

Sequential decision procedure:

media/file_copy.mp4

Figure 1: *Source: Windows 95*

1.5 Ballot-polling audits

The simplest framework for statistical audits.

Sequential decision procedure:

media/file_copy_with_replacement.mp4

Figure 2: *Source: Windows 95*