Predict Supreme Court Decisions: Machine Learning

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- SCOTUS
    - Appeals form lower cours
        - Writs of certiori (certs)
    - Original jurisdiction: sue federal gov
- To Predict
    - Use previous cases, public opinion
- Previous Research
    - Generality: create models for 1 set of 9 justices
        - Can't apply to more than 1 set
    - Consistency
        - Doesn't work for diff time periods
    - Out of sample applicability
        - If they try to add in new justice: data screwed up
- Feature Engineering
    - Take qualitivie features
    - Case and behavioral features
        - Case: issue, reason for cert
        - Turn into 13 different variables
    - Feature Binary encoding: cert ==> 13 indicator variables
    - Feature extraction or generation/extraction
        - Coarsen or collapse
        - Arithmethicallu derived fuatres
- Modeling
    - Training feature set is matrix D_T
        - Rows docket votes
        - Column: featrues
- Learning Algorithm
    - Random forest clasification
        - Subsets of Decision trees
        - Create a whole bunch of decisions and generate average decision
        - Many weak learners => strong learners
        - Forest of statitically diverse decision trees
    - Growing Forest
        - Fresh forest (Accuracy) vs growing (effieency)
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    - 5 new trees per term
- Results
  - Baseloin/null models
    - Optimized finite memory (M=10)
      - Last 10 years and look at court reversals
    - Infinite memeory
    - Always guess reverse
  - Leveles of Predition
    - Left case 71.9%
    - Right: justince 70.2%
- Implications
  - "Court observors, litigants, citizens and markets"
  - Baseline model
  - Any application of predictive analytics
  - Matters to big companies: know if they can win
    - Profits are on the line