Learning From Historical Precedent

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Those who cannot remember the past are condemned to repeat it—
Santayanna

One of the most curious features of the history of economic sanctions has been the extent to which the experience of past cases has been overlooked or ignored— Robin Renwick
Question: What would happen if the United States refused to sell computers to South Korea unless South Korea stopped exporting automobiles to Canada?

OCCAM¹: The goal of the United States that South Korea not sell automobiles to Canada will fail and South Korea will purchase computers from a country which exports computers. This happened when the United States did not sell grain to the Soviet Union after the Soviet Union invaded Afghanistan. Argentina sold grain to the Soviet Union. Also, Australia did not sell uranium to France after France exploded nuclear weapons in the South Pacific. South Africa sold uranium to France.

1. OCCAM's output is edited slightly, by adding tense information to verbs.
Learning from observations: Issues

- Aggregating examples into clusters of similar events
- Determining set of features relevant
- Explaining prediction

1921 League of Nations vs. Yugoslavia
threat: Refuse to import to Yugoslavia
demand: Stop invasion Albania
outcome: success

1948 USSR vs. Yugoslavia
threat: Cut off foreign aid
demand: Stop political independence
outcome: (fail) US give economic aid

1961 USSR vs. Albania
threat: Refuse to sell grain
demand: Stop economic ties with China
outcome: (fail) China sells Albania
Canadian wheat at lower price

1976 US vs. Ethiopia
threat: Stop aid (57 million)
demand: Stop human rights violations
outcome: (fail) Soviets provide aid

1980 US vs. USSR
threat: Cut off grain sales
demand: Withdraw troops from Afghanistan
outcome: (failure) Buy grain from Argentina at a higher price

1983 Australia vs. France
threat: Not sell uranium
demand: Stop nuclear tests
outcome: (fail) France buys from South Africa at higher price
Schemata in OCCAM

- Generalized event
- Causal chain
- Indices

(coerce
  actor (human)
  target (human wealth (rich)
    ipt (ipt type (parent) of =OBJECT))
  object (human)
  threat (kill actor =ACTOR
    object =OBJECT)
  demand (atrans actor =TARGET
    to =ACTOR
    object (MONEY)))

(coerce
  actor (polity exports =OBJECT)
  object (commodity)
  target (polity economy (strong)
    IMPORTS =object)
  threat (sell actor =ACTOR
    object =OBJECT
    to =TARGET
    mode (NEG)))
Explanation-based Learning

- Relevant features identified by domain theory
- Similar events are those that have the same explanation
- Explanation stored with schema

Two forms of prediction (and explanation)
  - Recognize and instantiate
  - Chaining

In OCCAM, EBL forms schemata to recognize successful and unsuccessful types of sanction incidents.

EBL analyzes why one example succeeds or fails, and constructs a general description of the class of situations that will have the same outcome for the same reason.

EBL removes features from a training example that were not needed to construct an explanation.
Explanation by chaining in OCCAM

```
root
  act
    type (act type (propel))
    type (act type (atrans))
    state
      type (state type (broken))
      initiates-affect
        object (state object (p-object price (expensive)
          owner (human)))
        initiates-affect (affect state (neg)
          char (human)))
    object (act object (p-obj composition (glass))
      result (state type (broken))
        object (p-obj composition (glass)))
```
OCCAM Control structure

OCCAM(Event)
Schema = find.most.specific.schema(Event)
if explains(Schema, Event)
    Then index.event(schema.event)
elseif chain.explanation(event)
    Then EBL(event, schema)
elseif cluster= retrieve.cluster(schema,event)
    Then SBL(event, cluster, schema)
else index.event(schema.event)

(def-rule demand-increase-->price-increase
  (STATE TYPE (DEMAND-INCREASE)
    ACTOR ?X: (POLITY ECONOMIC-HEALTH (STRONG))
    OBJECT ?Y: (COMMODITY AVAILABILITY (COMMON)))
  ENABLES
  (ACT TYPE (SELL)
    ACTOR (POLITY EXPORTS ?Y
      BUSINESS-REL ?X)
    TO ?X
    OBJECT ?Y
    PRICE (MONEY VALUE (>MARKET)))
1948 Soviet Union and Yugoslavia
The Soviet Union threatened to stop granting economic aid to Yugoslavia if Yugoslavia continued its attempts at political independence. The US offered $35,000,000 in aid and Yugoslavia continued to distance itself from the Soviet Union.

1. threat-> goal conflict
   (maintain economic health or achieve political freedom)

2. plan (undo-goal-linkage), find another mean of economic health

3. US wants to reduce influence of Soviet Union
4. Providing aid to Yugoslavia will reduce Soviet influence

5. Aid achieves Yugoslavia’s goal of economic health

6. Soviet threat does not cause a goal failure for Yugoslavia
7. Yugoslavia continues political freedom, Soviet Goal fails.
Question Answering

Concept completion questions (outcome).
1. Parse (English --> CD)
2. Find most specific schema(question)
3. Infer missing slots
4. Instantiate Explanation
5. Select Answer
6. Generate Answer (CD --> English)
(7 Explain Similar cases)
Analytic Learning vs. quantitative analysis (regression)

OCCAM can explain as well as predict.
EBL can identify relevant features.
EBL performs well with few examples.

Regression analysis tolerates the existence of unidentified factors.

Regression analysis can deal with “graded concepts” and quantitative information (i.e., amount of influence).

Future- Use EBL to determine relevant factors and quantitative techniques to determine amount of influence.