Task1: Predicting Citations

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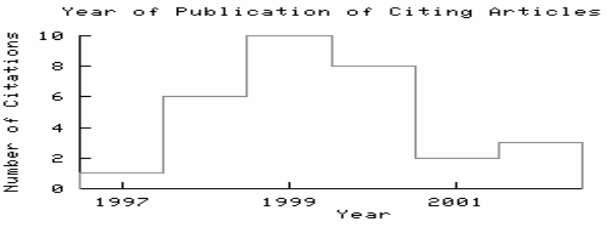
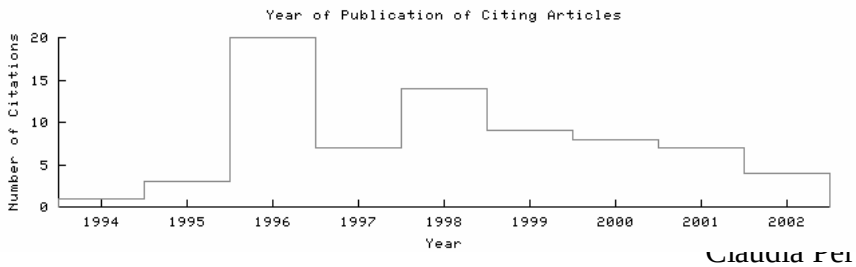
Citations





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Step 1: Feature Construction

- Temporal "shape" of citation counts:
  + counts for last 6 quarters and number of missing
- Seasonality of Publishing (conferences):
  + quarterly dummies
- Age of paper:
  + publication quarter
- Author reputation:
  + number of papers, total number of citations
  + median change at same paper "age"
- Paper reputation:
  + total and average number of citations per quarter

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Step 2: First Impression

- Very hard problem
  – Across quarters it is very hard to beat consistently a constant (Median -2 scores 1403)
- Distribution of target is not symmetric
  – L1 vs. L2 matters
- Strong but instable seasonality
  – The median delta varies
- Scaling differences across papers
  – Max citations: 2400, Average: 15
  – Only 10% of papers ever had more than 5 in a quarter

Q1	Q2	Q3	Q4
-3	-4	-2	-4
-2	-4	-1	-3
-2	-1	-2	-2

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Step 3: Training Considerations

- Normalization
  - Large variation in average citation counts
  - → Normalize by average of the last 3 quarterly counts
- Selection of Training Period
  - Potentially non-stationary due to conference schedules, age of database, ...
  - → Keep entire dataset
- Selection of Training Observations
  - Evaluation only on papers with at least 6 citations
  - → Only use observation where the last citation count was at least 6

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Step 4: Model Class Selection

Issues	Implications
L1 for Evaluation	• L2 as cost function is wrong • Median rather than mean
Integer Values	?
Noisy Task	Better bias than variance

Considered Options	L1	Integer	Noise
Linear Regression	-	?	+
Neural Network	-	?	-
Ordered Probit	?	+	+

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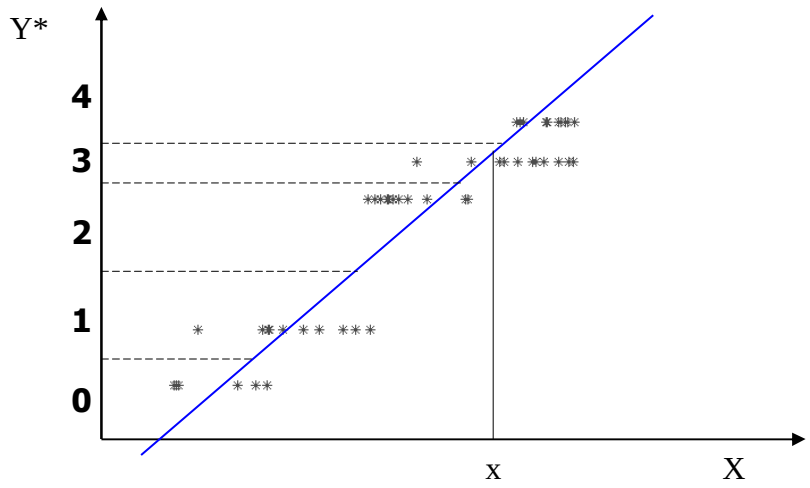
Ordered Probit Model



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Results and Comparison

- Final Model:
  - 10 categories: -7, ..., +2
  - Ordered Probit with special prediction
  - Curtail predictions between -4 and 0
- Results:
  - Winning Participant: 1329
  - Best constant (-2): 1403
  - Curtailing Predictions between -4 and 0: 1360

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