

Instance Based Learning Algorithms Implementation and Analysis

M. Toygar KARADENİZ

Bogaziçi University

1996

Instance Based Learning Algorithms

Concepts In Common

- Concept Description
- Similarity Function
- Classification Function
- Concept Description Adder
- Concept Description Remover

Instance Based Learning Algorithms

IBL #1

```
CD ← 0
for each x ∈ training set do
  for each y ∈ CD
    sim[y] ← similarity(x,y)
  ymax ← some y ∈ CD with maximal sim[y]
  if class(x) = class(ymax)
    then classification ← correct
  else classification ← incorrect
  CD ← CD ∪ {x}
```

Instance Based Learning Algorithms

IBL #2

```
CD  $\leftarrow$  0
for each x  $\in$  training set do
  for each y  $\in$  CD
    sim[y]  $\leftarrow$  similarity(x,y)
  ymax  $\leftarrow$  some y  $\in$  CD with maximal sim[y]
  if class(x) = class(ymax)
    then classification  $\leftarrow$  correct
  else
    classification  $\leftarrow$  incorrect
    CD  $\leftarrow$  CD  $\cup$  {x}
```

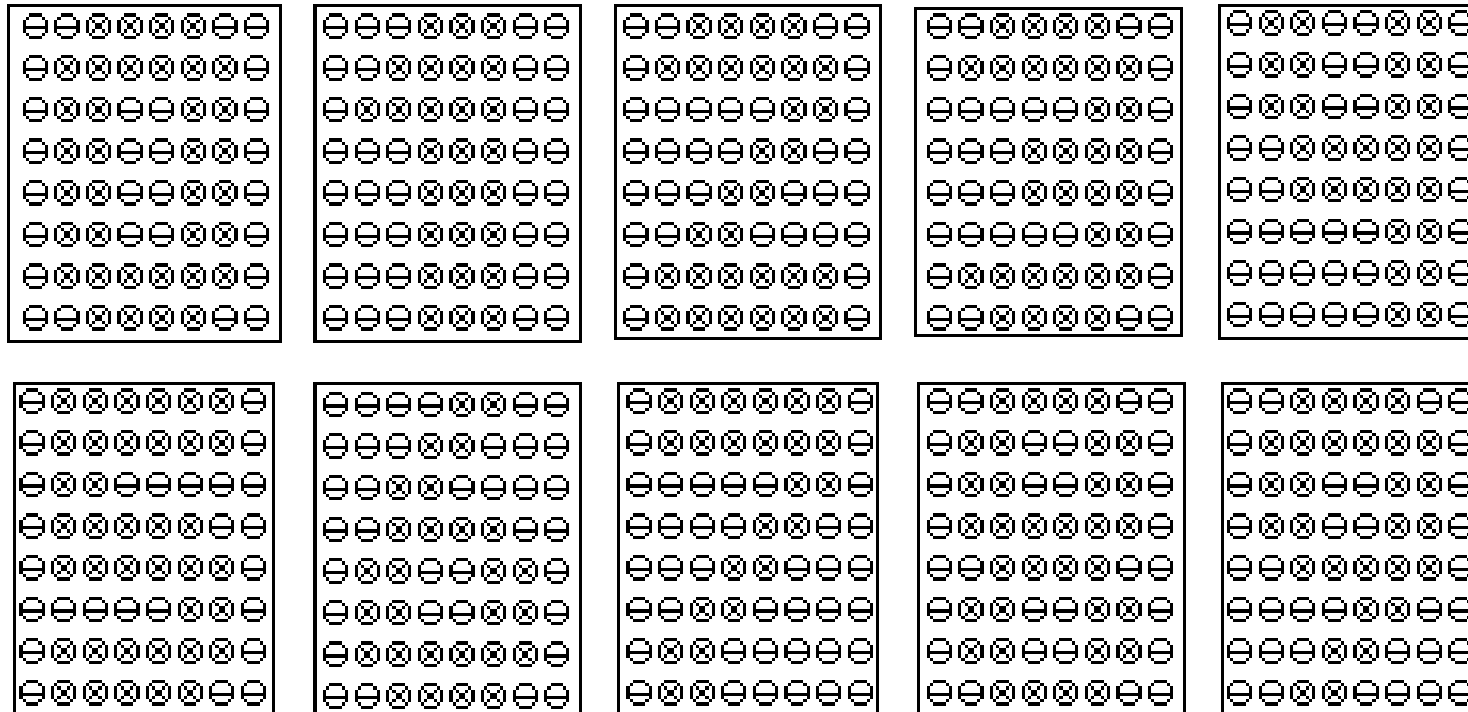
Instance Based Learning Algorithms

IBL #3

```
CD ← 0
for each x ∈ training set do
  for each y ∈ CD do
    sim[y] ← similarity(x,y)
  if ∃{y ∈ CD | acceptable(y)}
  then ymax ← some acceptable y ∈ CD with maximal sim[y]
  else
    i ← a randomly selected value in {1,|CD|}
    ymax ← some y ∈ CD that is the i-th most similar instance to x
  if class(x) = class(ymax)
  then classification ← correct
  else
    classification ← incorrect
    CD ← CD ∪ {x}
  for each y ∈ CD do
    if sim[y] ≥ sim(ymax)
    then
      update y's classification record
      if y's record is significantly poor
      then CD ← C - {y}
```

Instance Based Learning Algorithms

Domain Of Instance Sets



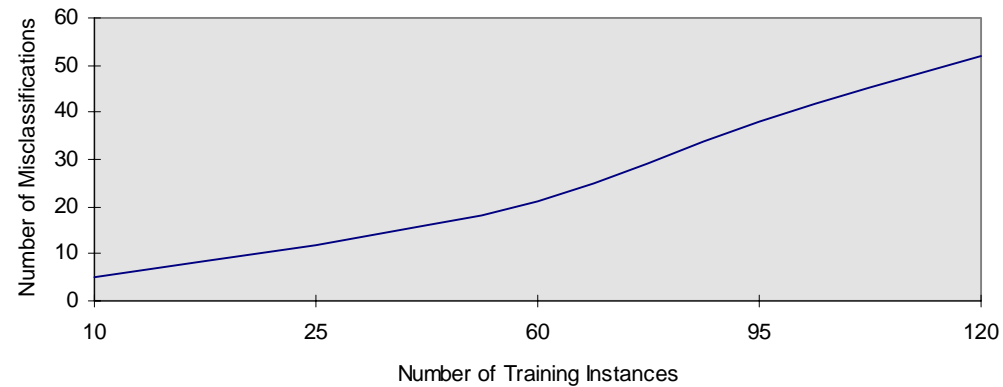
Deviations Of This Implementation From The Original Algorithms

- numerical values vs. digit images
- initial concept description
- IBL3 classification value

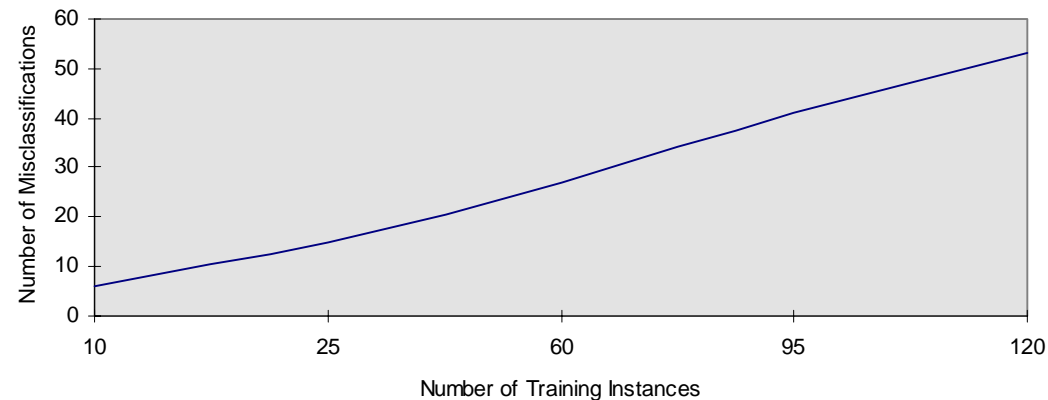
Instance Based Learning Algorithms

Graphical Results

IBL Algorithm #1



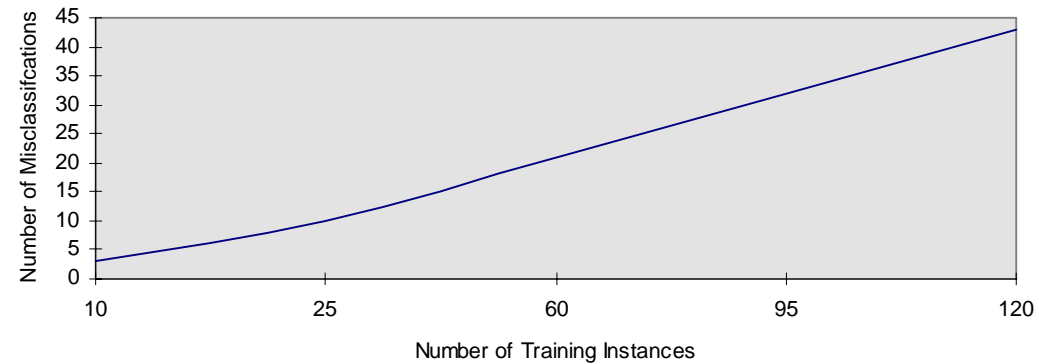
IBL Algorithms #2



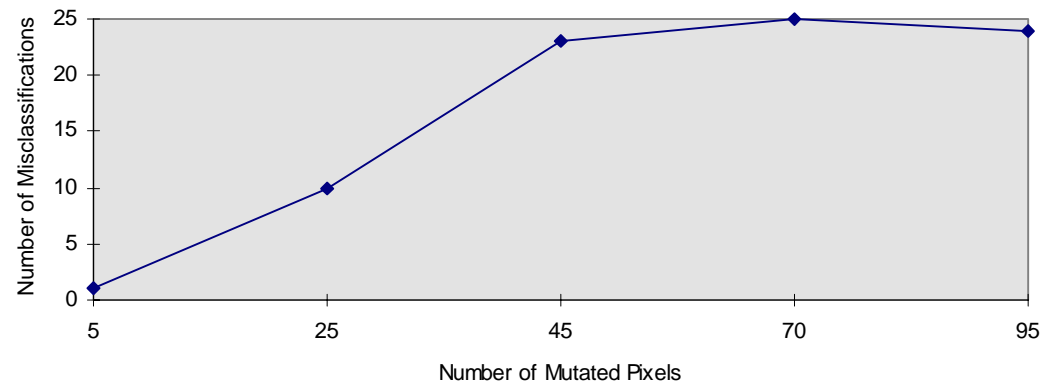
Instance Based Learning Algorithms

Graphical Results (cont.)

IBL Algorithm #3



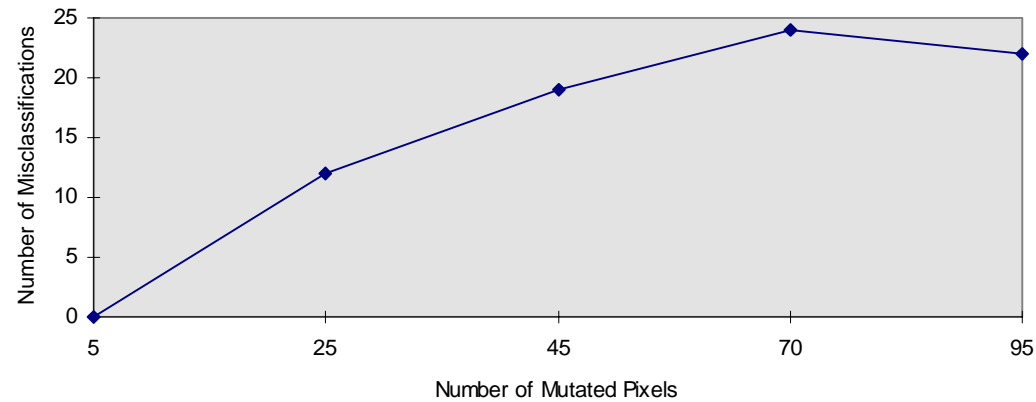
IBL Algorithm #1



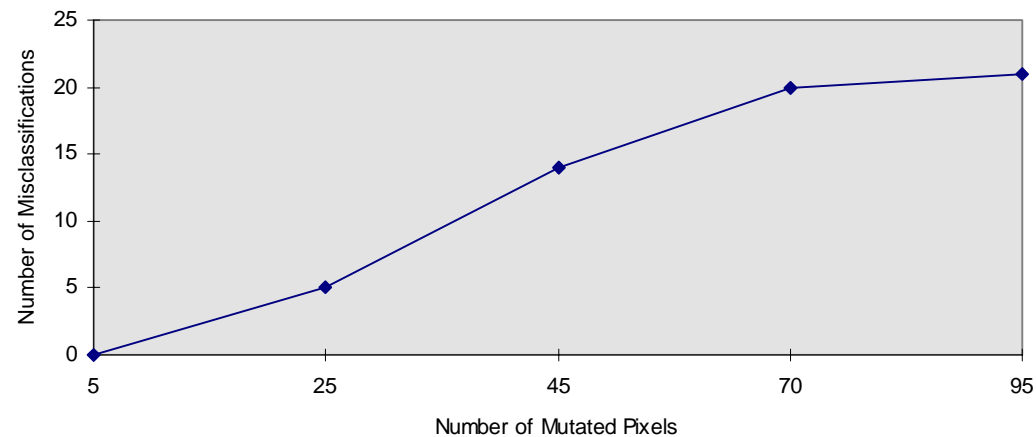
Instance Based Learning Algorithms

Graphical Results (cont.)

IBL Algorithm #2



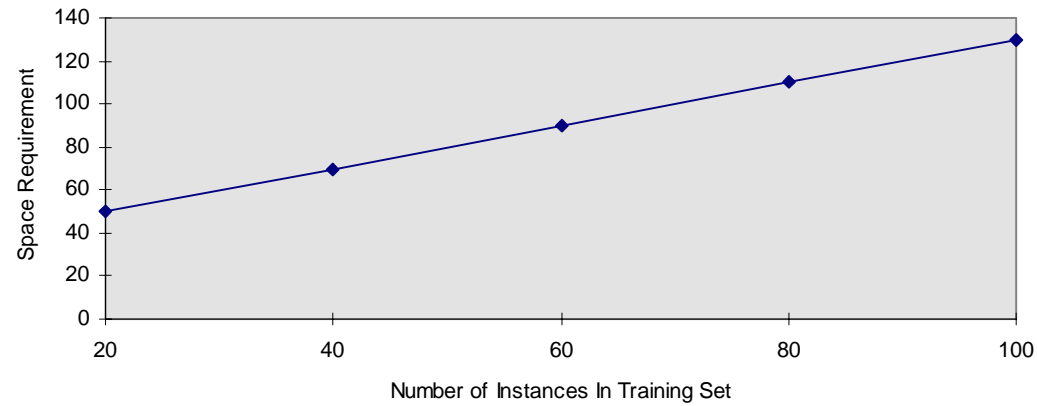
IBL Algorithm #3



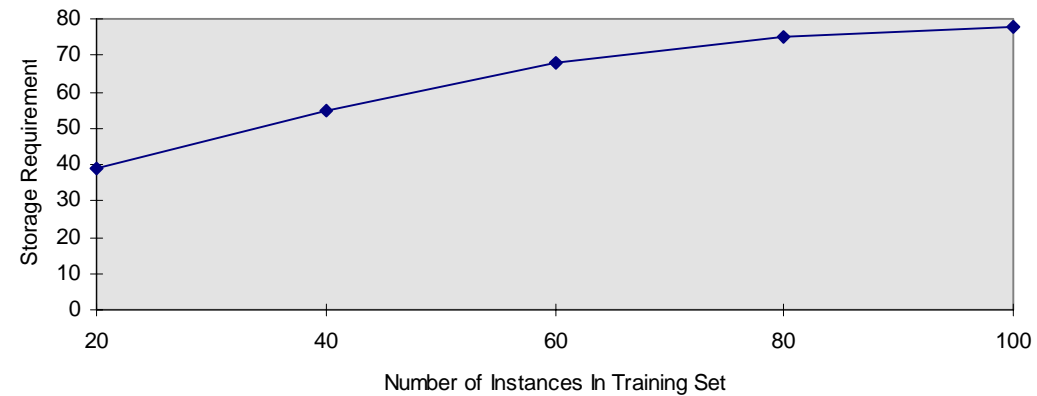
Instance Based Learning Algorithms

Graphical Results (cont.)

IBL Algorithm #1

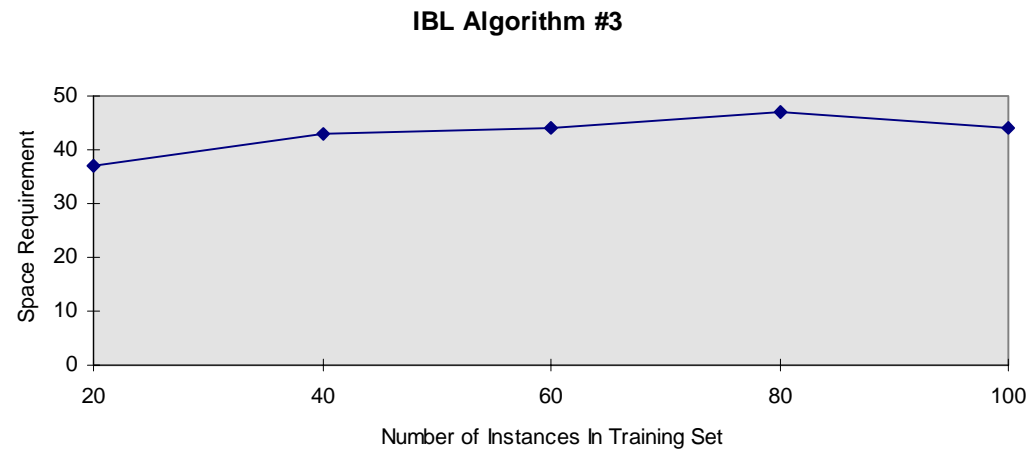


IBL Algorithm #2



Instance Based Learning Algorithms

Graphical Results (cont.)



Conclusion

- memorizing something vs. generalization of it
- perform even worse than neural networks
- may be used as the last chance
- domain of expertise must be suitable to memorize