Application of evolutionary algorithms to solve complex problems in quantitative genetics and bioinformatics

4. Differential Evolution

Vive la difference!

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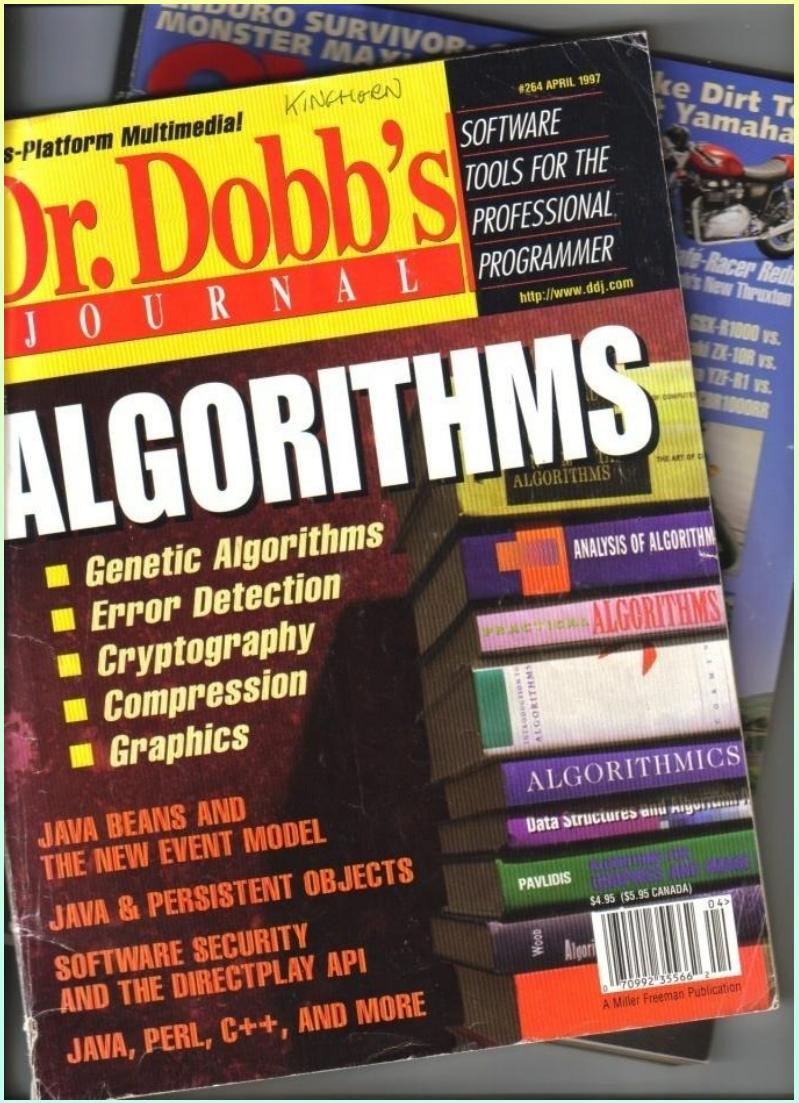
Differential Evolution

Price and Storn, 1997

- Small, Simple, Effective …

```
while (count < GEN_MAX)
{
  for (i=0; i<NP; i++)
  {
   do a=rnd_uni()*NP; while (a==i);
   do b=rnd_uni()*NP; while (b==i || b==a);
   do c=rnd_uni()*NP; while (b==i || b==a || c==b);
   j=rnd_uni()*D;
   for (k=1; k<=D; k++)
   {
    if(rnd_uni() < CR || k==D)
       {
           trial[j]=x1[c][j] + F*(x1[a][j]-x1[b][j]);
       }
       else
       {
           trial[j]=x1[i][j];
       }
       j=(j+1)/D
   }
   score=evaluate(trial);
   if(score<=cost[i])
    {
        for(j=0; j<D; j++)x2[i][j]=trial[j];
        cost[i]=score;
    }
    else for (j=0; j<D; j++) x2[i][j]=x1[i][j];
  }
for(i=0; i<NP; i++)
{
    for(j=0; j<D; j++) x1[i][j]=x2[i][j];
}
count++;
}
```



The DE algorithm

```
Sample base population:  parentallele(i, j) = -50 + 100 * Rnd
For generation = 1 to maxgens
    For individual = 1 to PopSize
        ' Make a challenger
            For j = 1 to N_loci
              Make challenger allele or use individual's
            Next Locus
        Compare fitness of challenger and individual
        Replace individual if challenger wins
    Next individual
Next generation
```


The End