

模版·动态规划(双序列对比)

```
public class SequenceAlignment{
    private static final int MATCH_SCORE=2;
    private static final int MISMATCH_SCORE=-1;
    private static final int GAP_PENALTY=-1;

    public static Pair<Integer,String> align(String sequence1,String sequence2){
        int m=sequence1.length();
        int n=sequence2.length();

        int[][] scoreMatrix=new int[m+1][n+1];

        for(int i=0;i<=m;i++){
            scoreMatrix[i][0]=i*GAP_PENALTY;
        }
        for(int j=0;j<=n;j++){
            scoreMatrix[0][j]=j*GAP_PENALTY;
        }

        for(int i=1;i<=m;i++){
            for(int j=1;j<=n;j++){
                if(sequence1.charAt(i-1)==sequence2.charAt(j-1)){
                    scoreMatrix[i][j]=scoreMatrix[i-1][j-1]+MATCH_SCORE;
                }else{
                    scoreMatrix[i][j]=Math.max(Math.max(scoreMatrix[i-1][j],scoreMatrix[i][j-1])+MISMATCH_SCORE,
                    scoreMatrix[i-1][j-1]+GAP_PENALTY);
                }
            }
        }

        StringBuilder sb=new StringBuilder();
        int i=m;
        int j=n;
        while(i>0&&j>0){
            if(scoreMatrix[i][j]==scoreMatrix[i-1][j-1]+MATCH_SCORE){
                sb.append(sequence1.charAt(i-1));
                sb.append(sequence2.charAt(j-1));
                i--;
                j--;
            }else if(scoreMatrix[i][j]==scoreMatrix[i-1][j]+MISMATCH_SCORE){
                sb.append(sequence1.charAt(i-1));
                sb.append("-");
                i--;
            }else{
                sb.append("-");
                sb.append(sequence2.charAt(j-1));
            }
        }
    }
}
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        j--;
    }
}

String alignment=sb.reverse().toString();

return new Pair<>(scoreMatrix[m][n],alignment);
}

public static void main(String[] args){
    String sequence1="ABCDE";
    String sequence2="ACDFG";

    Pair<Integer,String> result=align(sequence1,sequence2);
    System.out.println("最佳比对分数: "+result.getKey());
    System.out.println("比对结果: ");
    System.out.println(result.getValue());
}
}

```