Churn is the propensity of customers to switch between service providers, appetency is the propensity of customers to buy a service, and up-selling is the success in selling additional good or services to make a sale more profitable.

• Churn problem: 7.3% positive instances (3672/50000 on train).

• Appetency problem: 1.8% positive instances (890/50000 on train).

• Up-selling problem: 7.4% positive instances (3682/50000 on train).

传统的F-measure或平衡的F-score (F1 score)是精度和召回的调和平均值：

F1=2precision∗recallprecision+recall