Introduction and Motivation

Business model of online game companies usually depends on:
• Sale of virtual items
• Monthly subscriptions in which gamers must pay for credits to continue their adventures in the virtual world.

Being able to predict how long people will stay in the game will directly affect game companies' revenue.

This study provides a practical scheme for predicting player unsubscribe:
• Input – a player's game hours
• Output – whether or not he will renew an expiring subscription.

Our rationale - if we can predict the departure of a player before he actually quits a game, the game operator can take remedial measures to prevent it from happening and improve the game along the way based on the feedback provided by such a player.

Our traces are from ShenZhou Online, a mid-scale commercial MMORPG in Taiwan sustaining at any moment thousands of players online.

<table>
<thead>
<tr>
<th>ShenZhou Online Traces Summary</th>
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<tbody>
<tr>
<td>Start date</td>
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<tr>
<td>End date</td>
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<tr>
<td>Length</td>
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<td>Total sessions</td>
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<td>Accounts observed</td>
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<td>Subscrumed accounts</td>
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Figure 1: Summary of ShenZhou traces

Classification of Online Gamers

From observations on gamers' playing history (as in Fig.2), an intuitive categorization of unsubscribing players:
• Fade-out, with ever-decreasing daily playtime and login frequency
• Sudden-out, no noticeable tendency in daily playtime or login frequency

Figure 2: The playing history of six sample gamers

How to perform automated classification?
1. Randomly choose 2,000 gamers, classify them with the human eye
2. Divide each gamer’s history into k periods of equal length
3. Evaluate the average daily playtime and playing density in each period
4. SVM as classifier, treat k-period features and predetermined categories as the training data set.

Model for Predicting Unsubscription

How to predict whether a gamer is leaving in d days? (d in [3, 60])

1. Assign prediction point at d days before his quitting
2. Derive two random observation windows, counting from the gamer’s first login day
3. Leavin window – contains the prediction point, unsubscribe within d days after window; staying window – not contain the prediction point, still stay at least d days after window
4. Extract 16-period features from each window
5. Fed to the SVM along with corresponding window type

Figure 3: The classification accuracy of different values of k

Figure 4: Predictivity of our classification method.

Figure 5: Unsubscription prediction accuracy

The combination of our classification method and prediction model:

Complete Scheme

Input – a player’s incomplete trace
Output – three way output:
• Sudden-out pattern (or just unpredictable)
• Staying for the time being
• Leaving within a specific number of days.

The accuracy of our complete prediction scheme is shown in Fig.7, and Fig.8 shows the three types of errors.

Figure 6: The complete unsubscription prediction scheme

Conclusion

The ability to predict a gamer’s departure is coveted by the MMORPG industry as it allows the game operators to target their resources on keeping subscribers motivated and to benefit from these loyal customers. To this end, we hope that our scheme will prove helpful to operators, as well as gamers who may enjoy a better gaming environment because of it.