Jessica Lustgarten (morning section) Due: 10/22/12

James Belfer (afternoon section)

Decision Models – Movie Remake Maker Appendix

**Managerial Problem Definition**

*Decision Variables*

We need to decide which five films we should choose to remake from the top 200 films released prior to 2000 based on number of box office attendees.

*Objective*

Minimize the audience growth ratio (the change in number of audience on opening and total audience divided by change in opening # screens to widest screen count) of the films selected for remake.

*Constraints*

Five total films must be selected across a range of seven genre types (Comedy, Drama, Action, Horror, Sci-Fi, Thriller, and Animation).

There must be no more than one film selected from any given genre.

There is a non-negativity constraint, as we cannot produce a negative number of films.

**Mathematical Formulation**

*Decision Variables*

Define *X*i to be a binary variable, identifying the films that have been selected for remake, such that *X*i = 0 if film *i* is not selected for remake, and *X*i = 1 if film *i* is selected for remake.

As we are choosing from 200 films, we have 200 decision variables, ranging from *X*1 to *X*200.

Define *Y*i to be the audience growth ratio (the change in number of audience on opening and total audience divided by change in opening # screens to widest screen count) of film *i*

*Non-Decision Variables*

Define *g*i to be an integer variable identifying film *i*’s genre, such that:

* + *g*i = 1 if film *i* is a Comedy,
  + *g*i = 2 if film *i* is a Drama,
  + *g*i = 3 if film *i* is an Action,
  + *g*i = 4 if film *i* is a Horror,
  + *g*i = 5 if film *i* is a Sci-Fi,
  + *g*i = 6 if film *i* is a Thriller,
  + and *g*i = 7 if film *i* is an Animation.

For example, if film 3 is a comedy, then *g*3 = 1

Define *a*i to be a binary variable such that *a*i = 1 if film *i* has been both selected for remake and is a Comedy, and *a*i = 0 otherwise

Define *b*i to be a binary variable such that *b*i = 1 if film *i* has been both selected for remake and is a Drama, and *b*i = 0 otherwise

Define *c*i to be a binary variable such that *c*i = 1 if film *i* has been both selected for remake and is a Action, and *c*i = 0 otherwise

Define *d*i to be a binary variable such that *d*i = 1 if film *i* has been both selected for remake and is a Horror, and *d*i = 0 otherwise

Define *e*i to be a binary variable such that *e*i = 1 if film *i* has been both selected for remake and is a Sci-Fi, and *e*i = 0 otherwise

Define *f*i to be a binary variable such that *f*i = 1 if film *i* has been both selected for remake and is a Thriller, and *f*i = 0 otherwise

*Parameters*

Define *Y*i to be the audience growth ratio (the change in number of audience on opening and total audience divided by change in opening # screens to widest screen count) of film *i*

*Objective*

Minimize

*Constraints*

For all *i*, 1≤ *i* ≤ 200

For all *X*i, *X*i is binary.

For all *g*i, 1≤ *g*i ≤ 7

For all *a*i, *b*i,*c*i, *d*i, *e*i, and *f*i; *a*i, *b*i,*c*i, *d*i, *e*i, are each binary.

For all *a*i, *b*i,*c*i, *d*i, *e*i, and *f*i: