# Fallout: Shelter

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- Postapocalyptic mobile game
- You control a shelter full of dwellers
- One thing dwellers can do is scout
- Scouts retrieve bottlecaps and items
- Scouts face deadly challenges

# Character stats


- SPECIAL stats ($\in 1..10 + \text{bonus}$)
  - Strength
  - Perception
  - Endurance
  - Charisma
  - Intelligence
  - Agility
  - Luck
  - Bonus from armour (blue)
- Level (assumed to be discrete)
- Happiness (assumed to be insignificant)
- Weapon damage

# Retrieval: Intro

- We wanted to know what determined how fast a scout found items and bottlecaps
- We performed a linear analysis and looked at the p-values
- The goal is to figure out if some dwellers are better scouts than others

# Retrieval: Items

Table: Number of items per hour

| | Estimate Std. | Error | t value | Pr(>\|t\|) | |
|---|---|---|---|---|---|
| (Intercept) | 1.290960 | 0.771921 | 1.672 | 0.0959 | . |
| level | -0.021353 | 0.017178 | -1.243 | 0.2152 | |
| dmg | -0.060882 | 0.057463 | -1.059 | 0.2906 | |
| s | -0.003986 | 0.055532 | -0.072 | 0.9428 | |
| p | -0.079242 | 0.095350 | -0.831 | 0.4069 | |
| e | 0.031539 | 0.070731 | 0.446 | 0.6561 | |
| c | -0.057148 | 0.091382 | -0.625 | 0.5324 | |
| i | 0.324587 | 0.335993 | 0.966 | 0.3351 | |
| a | 0.214665 | 0.133610 | 1.607 | 0.1096 | |
| l | 0.042945 | 0.073570 | 0.584 | 0.5600 | |

# Retrieval: Bottlecaps

Table: Average number of caps per hour

| | Estimate | t value | Pr(>\|t\|) | |
|---|---|---|---|---|
| (Intercept) | 83.81787937 | 11.63356 | <2e-162 | *** |
| s | -0.21649106 | -0.43309 | 0.665802 | |
| p | 0.61211724 | 0.91113 | 0.364235 | |
| e | -0.88781188 | -1.67151 | 0.097489 | . |
| c | -0.18453188 | -0.31035 | 0.756888 | |
| i | 0.19836365 | 0.35132 | 0.726024 | |
| a | -0.04815488 | -0.08799 | 0.930043 | |
| l | 13.48815469 | 26.55579 | <2e-16 | *** |
| start.level | -0.68088744 | -4.25171 | 0.00004495 | *** |
| start.damage | -1.56703535 | -1.97083 | 0.051278 | . |
| level.increase | -3.44085855 | -1.97599 | 0.050683 | . |
| death.damage | 0.30906873 | 0.88693 | 0.377067 | |

# Retrieval: Conclusions

- Difficult to determine what affects items found. Two p-values stand out, but are still bad.
  - Intercept has p-value 0.96
  - Agility has p-value 1.1
- Caps found clearly determined by Luck (infinitesimal p-value). There's also a base value (intercept). There is also a small but clear negative correlation with level, hard to tell why this is.

# Survival: Intro

- Scouts face a variety of threats.
- Threats can deal damage both as lost hit points and radiation, too much of either results in death.
- Death is nonpermanent but expensive.
- By calculating the expected time of death for a scout we can choose how long we dare to let our scouts roam.

# Survival: P-values

Table: Survival time

| | t value | Pr(>\|t\|) | |
|---|---|---|---|
| (Intercept) | -1.7983755246 | 0.074911 | . |
| s | 2.4166724012 | 0.017339 | * |
| p | 0.9644124169 | 0.336994 | |
| e | 7.6484812878 | 9e-11 | *** |
| c | 0.6092526555 | 0.543637 | |
| i | 1.9626433352 | 0.052260 | . |
| a | 1.0647793211 | 0.289351 | |
| l | -5.9440869849 | 3e-7 | *** |
| start.level | 12.3797838804 | <2e-16 | *** |
| start.damage | 4.1308435539 | 7e-4 | *** |
| level.increase | 6.4636998849 | 3e-8 | *** |
| caps | 6.2586709017 | 8e-8 | *** |
| death.damage | 0.7153117136 | 0.475960 | |

# Survival: Models

- The best p-values among the controllable variables belong to endurance, luck, level, and starting damage.
- Selected models
  - Linear model over all four
  - Polynomial models over one of the above
  - Random forest

# Survival: Performance

# Survival: Conclusions

# Questions

- Questions?