

DiggyPop Advisor — Recommendation Algorithm

Technical Documentation · Version 1.0 · February 2026

1. Overview

The DiggyPop Advisor generates personalized play recommendations for each user based on their gameplay data across three game types: **Charades**, **MojiMatch**, and **Sound Challenge**. The system uses a rule-based engine with hardcoded thresholds — no machine learning is involved. Each rule evaluates one or more computed metrics against fixed thresholds and produces a recommendation with a priority level (HIGH, MEDIUM, or LOW) and a category tag.

2. Input Data Sources

Data Source	Key Fields Used	Records
Charades (GameplayDataCharades)	uuid, eventName, selectedDecks, points, createdAt	~1,166 events ~186 unique users
MojiMatch (GameplayDataMojiMatch)	uuid, graderLabel, playerLabel, GWcoins, totalSessionTimeSeconds	62 sessions ~30 unique users
Sound Challenge (GameplayDataSoundChallenge)	uuid, eventName, playerGuesses, points, selectedDecks	14 events 1 unique user

3. Computed Metrics

Before evaluating rules, the following metrics are computed for each user profile:

3.1 Total Sessions

```
totalSessions = charades.sessions + mojiMatch.length +
soundChallenge.sessions
```

Simple sum across all three game types. Charades sessions come from counting GAME_START events per user. MojiMatch sessions are individual rows in the MojiMatch table. Sound Challenge sessions are counted from GAME_START events.

3.2 MojiMatch Accuracy (per session)

```
accuracy = count(graderLabels[i] === playerLabels[i]) / len(graderLabels)
```

For each MojiMatch session, the graderLabels array (adult/ground truth) is compared element-by-element with the playerLabels array (child's responses). A strict string equality check is performed. The number of matches is divided by the total number of items to produce a 0.0–1.0 accuracy score.

3.3 Average MojiMatch Accuracy

```
avgAccuracy = sum(session.accuracy for all sessions) / numSessions
```

Simple arithmetic mean of per-session accuracy scores. Returns null if the user has zero MojiMatch sessions.

3.4 MojiMatch Accuracy Trend

```
trend = lastSession.accuracy - firstSession.accuracy
```

Sessions are sorted chronologically by createdAt. The trend is the difference between the last session's accuracy and the first session's accuracy. Positive values indicate improvement; negative values indicate decline. Returns null if fewer than 2 sessions exist.

3.5 Days Since Last Play

```
daysSince = floor((referenceDate - max(lastPlayDates)) / 86400000)
```

Collects the most recent date from: charades.lastPlay, the latest mojiMatch.createdAt, and soundChallenge.lastPlay. The maximum (most recent) date is subtracted from the reference date (currently hardcoded to 2026-02-27). Result is in whole days. Returns 999 if no dates exist.

3.6 Charades Completion Rate

```
completionRate = round(charades.completedGames / charades.sessions * 100)
```

completedGames counts events with eventName = GAME_END_SHARE or GAME_END_DELETE (both indicate the game was played to completion). sessions counts GAME_START events. The ratio gives the percentage of started games that were actually finished.

4. Recommendation Rules

Rules are evaluated in the order listed below. Each rule independently checks its conditions and may or may not fire. A single user can trigger multiple rules. All generated recommendations are collected and then sorted by priority (HIGH → MEDIUM → LOW) before display.

Rule 1: Inactivity Detection

Evaluates how many days have passed since the user's last session.

Condition	Priority	Tag	Output Title
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daysSince > 60	HIGH	Engagement	User Has Gone Inactive
daysSince > 14 (and \leq 60)	HIGH	Frequency	Resume Regular Play
daysSince > 5 (and \leq 14)	MEDIUM	Frequency	Session Gap Detected

Threshold rationale: 5 days means the user has missed the recommended 3x/week cadence. 14 days represents a serious drop-off. 60 days likely indicates churn. Only the first matching condition fires (they are mutually exclusive via else-if).

Rule 2: Low Game Completion Rate

Fires only if Charades data exists for this user.

Condition	Priority	Tag	Output Title
completionRate < 50%	HIGH	Engagement	Low Game Completion Rate

Rationale: Finishing fewer than half of started games suggests frustration or loss of interest.

Recommendation suggests shorter sessions or easier decks to build momentum.

Rule 3: MojiMatch Accuracy Level

Fires only if user has ≥ 1 MojiMatch session. Exactly one sub-condition fires (mutually exclusive).

Condition	Priority	Tag	Output Title
avgAccuracy < 0.50 (50%)	HIGH	MojiMatch	Emotion Labeling Needs Support
avgAccuracy < 0.75 (75%)	MEDIUM	MojiMatch	Growing Emotion Recognition
avgAccuracy \geq 0.75 (75%)	LOW	MojiMatch	Strong Emotion Recognition

Threshold rationale: 50% is approximately chance-level performance for a multi-class emotion labeling task (7 emotions), meaning the child is essentially guessing. 75% indicates solid but not yet mastered recognition. $\geq 75\%$ suggests readiness for increased difficulty.

Rule 4: MojiMatch Accuracy Trend

Fires only if user has ≥ 2 MojiMatch sessions. Up to one sub-condition fires.

Condition	Priority	Tag	Output Title
trend < -0.15 (declined 15+ pp)	MEDIUM	MojiMatch	Accuracy Declining
trend > +0.10 (improved 10+ pp)	LOW	MojiMatch	Accuracy Improving

Rationale: Asymmetric thresholds are used intentionally. A decline of 15 percentage points is flagged as MEDIUM because it is more actionable (may require intervention). An improvement of 10 points is flagged as LOW (positive reinforcement only). If the trend is between -0.15 and +0.10, no recommendation is generated — the performance is considered stable.

Rule 5: Deck Variety

Fires only if Charades data exists. Two sub-rules (not mutually exclusive but unlikely to both fire due to thresholds).

Condition	Priority	Tag	Output Title
decks.length == 1 AND sessions > 3	MEDIUM	Variety	Try More Deck Themes
decks.length ≤ 2 AND sessions > 8	LOW	Variety	Expand Deck Variety

Suggestion pool: [Animals, Faces, Colors, Objects, Sports]. The system filters out decks the user already plays and suggests the first 3 remaining. Session thresholds (3 and 8) avoid flagging brand-new users before variety becomes meaningful.

Rule 6: Low Charades Scores

Condition	Priority	Tag	Output Title
avgPoints < 1.5 AND sessions ≥ 4	MEDIUM	Charades	Low Charades Scores

Rationale: The overall median avgPoints across all users is ~2.5. A threshold of 1.5 is noticeably below average. The 4-session minimum avoids flagging users who just started. Recommendation suggests switching from abstract decks (Emotions) to concrete decks (Animals, Objects).

Rule 7: Cross-Game — Suggest MojiMatch

Condition	Priority	Tag	Output Title
charades.sessions > 5 AND mojiMatch.length == 0	MEDIUM	Cross-game	Try MojiMatch

Encourages users who are active in Charades to also try MojiMatch, which builds emotion recognition through labeling rather than acting.

Rule 8: Cross-Game — Suggest Charades

Condition	Priority	Tag	Output Title
mojiMatch.length > 0 AND (charades == null OR sessions < 3)	MEDIUM	Cross-game	Try Charades

Inverse of Rule 7. Encourages MojiMatch-active users to add Charades for the physical/expressive dimension of emotion practice.

Rule 9: Faces Deck Progression

Condition	Priority	Tag	Output Title
decks includes 'Emotions' AND decks excludes 'Faces' AND sessions > 10	LOW	Progression	Consider the Faces Deck

The Faces deck uses real human facial expressions rather than emojis/icons, adding complexity. This is a natural progression for users experienced with the Emotions deck.

Rule 10: Power User Encouragement

Condition	Priority	Tag	Output Title
totalSessions ≥ 25	LOW	Engagement	Power User

Positive reinforcement for high-engagement users. 25 sessions represents the top ~30% of the user base.

5. Output Sorting

All recommendations generated by the rules above are collected into an array and sorted by priority using a numeric mapping:

Priority	Sort Value	Displayed First?
HIGH	0	Yes — top of list
MEDIUM	1	Middle
LOW	2	Bottom of list

Within the same priority level, recommendations appear in evaluation order (Rule 1 through Rule 10). There is no secondary sort key.

6. Threshold Summary Table

Metric	Threshold	Value	Rationale
Days inactive	Churn	> 60 days	Likely lost user
Days inactive	Drop-off	> 14 days	Missed multiple weeks
Days inactive	Gap	> 5 days	Missed 3x/week target
Completion rate	Low	< 50%	More abandoned than finished
MojiMatch accuracy	Needs support	< 50%	Near chance-level
MojiMatch accuracy	Progressing	< 75%	Below mastery
MojiMatch accuracy	Strong	≥ 75%	Ready for harder content
Accuracy trend	Declining	< -15pp	Significant regression
Accuracy trend	Improving	> +10pp	Notable progress
Deck count	Single deck	= 1, sessions > 3	Needs variety
Deck count	Low variety	≤ 2, sessions > 8	Could benefit from more
Charades points	Low	< 1.5 avg	Below median (~2.5)
Cross-game	No MojiMatch	0 sessions, 5+ charades	Missing game type
Cross-game	No Charades	0-2 sessions, has moji	Missing game type

Total sessions	Power user	≥ 25	Top ~30% of users
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7. Known Limitations

- **Hardcoded thresholds:** All thresholds are manually set based on data distribution analysis, not trained on user outcomes. They should be validated and tuned with clinical input.
- **No weighting between rules:** A user can receive up to ~10 recommendations with no prioritization within the same priority level. There is no cap on recommendations per user.
- **Equal emotion weighting:** The accuracy calculation treats all emotions equally. In practice, some emotions (contempt, disgust, fear) are significantly harder to label than others (happy, sad). A weighted accuracy could be more clinically meaningful.
- **Trend uses only first/last:** The accuracy trend calculation only compares the first and last session. It does not account for non-linear patterns (e.g., improvement followed by regression).
- **No session duration analysis:** While session time data is available in MojiMatch, no rules currently evaluate whether sessions are too short or too long.
- **Sound Challenge data is sparse:** Only 1 user has Sound Challenge data in the current dataset, so no meaningful rules exist for this game type beyond cross-game suggestions.
- **Static reference date:** The days-since-last-play metric uses a hardcoded reference date (2026-02-27) rather than the current date. In a production system this should use Date.now().