Real-time User Generated Content Personalization for a Global Entertainment Giant
Recombee & 9GAG Collaboration

9GAG is a global cross-platform entertainment network with 200+ million audiences worldwide. Ranked #1 in cross-platform video creation in the US, 9GAG distributes 8.4 billion video views and 3.5 billion page views monthly through all platforms.

Recombee's smart content recommendations helped 9GAG to fully personalize their homepage infinite scroll to increase multiple KPIs, including post views, the overall number of interactions, and total session duration of all users.

Recombee's recommender engine brought a significant increase also in user engagement as well as overall satisfaction.

EXECUTIVE SUMMARY

37% increase
In post views

22% more
Of overall interactions

7.5% higher
Users' session duration

2.8% increase
In the number of visits
9GAG started in 2008 as a site for hosting and distributing funny pictures and videos. Back then, social networks like Facebook or Twitter were on the rise, and people would use them to share the user-generated content they found on 9GAG.

9GAG introduced the revolutionary infinite scroll in 2012.

Today, the global entertainment giant has more than 40 million registered users worldwide, making it the largest meme community on the internet.
**Situation**

Hundreds of millions of monthly post views and other interactions

Millions of heavy users visiting the site very frequently, always looking for something new

Huge catalog of continuously growing user-generated content

In-house recommender system for personalized feeds

**Requirements**

A solution capable of replacing the current Home infinite feed under high traffic and minimal response time

Instant recommendation of newly added posts

Comprehensive set of business requirements to ensure compatibility with the current feed

Incremental model learning with constantly incoming interaction, text, and image data

Ensuring that every user sees a brand new feed whenever they return to the page
Development of a custom recommendation logic that exactly matches 9GAG’s product vision and expectations.

Complex and diverse ensemble of incrementally-trained recommendation models.

Collaborative Filtering

Content-Based
- Utilizing latest deep-learning approaches
- NLP of titles and meme OCRs
- Image processing of both static memes and sampled video frames

Reinforcement Learning (Contextual Bandits)

Optimization for multiple complex user engagement KPIs including the number of interactions, total visits, total session duration, retention rate, and other metrics.

Delivery of recommendations in 50ms on average.
Challenges of the User-Generated Content

Users are continuously adding new posts to 9GAG's platform, so to achieve high-quality personalization, the recommendation system must be able to process them instantly.

Newly added posts must gain immediate traction by being recommended to the right users through either similarity of visual/textual content or first interactions received.

Traditional recommender systems that utilize a standalone "model training phase" cannot handle such situation well, because when the batch training of traditional recsys model is finished, the model is already obsolete.

Recombee's unique technology of online and incremental model training is designed to ensure smooth personalization for huge and ever-growing catalogs.

In combination with reinforcement learning, Recombee can also identify and promote "hidden gems", which is critical for any social network.
Infinite Scroll Personalization

To let its users flow through the extensive amount of continuously growing content with no boundaries, 9GAG deployed Recombee's Infinite Scroll.

The feature allows users to infinitely scroll through auto-generated recommendations without switching to new tabs, providing the infinite feed for any screen width and autoloading the personalized recommendations in real-time on a mere scroll.

Continuous delivery of personalized content as users scroll down

Bottomless browsing experience with automated feed

Great user experience, especially for touchscreens on e.g., mobile devices
“Hot Feed” (“Home Feed”)

Content recommendations

Recombee was tested in an extensive A/B test directly on the user’s Home feed, which is the main place where users consume most content.

The A/B test ran for over 50 days and looked at a range of metrics, including those measuring the long-term impact of Recombee on the Home feed.

Recombee has been convincingly proven to optimize not only immediate engagement (CTR, upvotes, session duration) but also long-term user retention and frequency of visits.

Based on the test results, Recombee now powers 100% of the Home feeds of all registered users.

| Items to User | Recommendation Type | 9gag:personal | Recommendation Logic |
Improvements Thanks to Recombee

Home Feed Interactions
+22% More Overall
  +37% Post Views
  +15% Post Saves
  +5% Post Shares
  +14% Post Upvotes
  -4% Post Downvotes

Home Feed Sessions
+3% Number of Sessions
+7.5% Total Session Duration of all Users
+4% Average Session Duration

Sitewise Visits
+2.8% Number of Total Visits
+1.5% Number of Unique Visitors

User Engagement
• More Clicks, Comments, Upvotes
• Less Downvotes
• Longer Sessions

User Retention
• More Visiting Users
• Increased Frequency of Visits
• Higher Total Time Spent
“Daily traffic to the 9GAG site amounts to hundreds of millions of users worldwide. To provide a unique user experience for each and every one of them, we needed to implement a recommendation system that would allow for the most advanced, real-time personalization of their experience. So we chose Recombee. Thanks to their solution, we managed to increase, among other KPIs, post views by 37%, overall interactions by 22%, and users’ session duration by 7.5%. With Recombee, we’ve taken engagement with user-generated content to the next level.”

Kristie Chen, Product Head at 9GAG
"Why waste time and money on the development of your own recommender system, if you can use the most advanced engine tailored by data scientists."

Excellent scalability, big data infrastructure

**Universal SaaS solution** verified on **multiple verticals**

**Real time** machine learning

**Simple and intuitive API + SKDs** for easy integration

**Research and improvements** on sophisticated algorithms and AI

**Graphical user interface for monitoring KPIs**