

Harmful Terms and Where to Find Them: Measuring and Modeling Unfavorable Financial Terms and Conditions in Shopping Websites at Scale

Full Bibliographic Reference:

Elisa Tsai, Neal Mangaokar, Boyuan Zheng, Haizhong Zheng, and Atul Prakash. 2025. Harmful Terms and Where to Find Them: Measuring and Modeling Unfavorable Financial Terms and Conditions in Shopping Websites at Scale. In Proceedings of the ACM Web Conference 2025 (WWW '25), April 28–May 2, 2025, Sydney, NSW, Australia. ACM, New York, NY, USA, 14 pages.
<https://doi.org/10.1145/3696410.3714573>

Abstract:

Terms and conditions for online shopping websites often contain terms that can have significant financial consequences for customers. Despite their impact, there is currently no comprehensive understanding of the types and potential risks associated with unfavorable financial terms. Furthermore, there are no publicly available detection systems or datasets to systematically identify or mitigate these terms. In this paper, we take the first steps toward solving this problem with three key contributions.

First, we introduce TermMiner, an automated data collection and topic modeling pipeline to understand the landscape of unfavorable financial terms. Second, we create ShopTC-100K, a dataset of terms and conditions from shopping websites in the Tranco top 100K list, comprising 1.8 million terms from 8,251 websites. Consequently, we develop a taxonomy of 22 types from 4 categories of unfavorable financial terms—spanning purchase, post-purchase, account termination, and legal aspects. Third, we build TermLens, an automated detector that uses Large Language Models (LLMs) to identify unfavorable financial terms.

Fine-tuned on an annotated dataset, TermLens achieves an F1 score of 94.6% and a false positive rate of 2.3% using GPT-4o. When applied to shopping websites from the Tranco top 100K, we find that 42.06% of these sites contain at least one unfavorable financial term, with such terms being more prevalent on less popular websites. Case studies further highlight the financial risks and customer dissatisfaction associated with unfavorable financial terms, as well as the limitations of existing ecosystem defenses.

Harmful Terms and Where to Find Them: Measuring and Modeling Unfavorable Financial Terms and Conditions in Shopping Websites at Scale

Elisa Tsai, Neal Mangaokar, Boyuan Zheng, Haizhong Zheng, Atul Prakash
University of Michigan

To appear at WWW 2025

1. Problem

Online shopping website T&Cs can contain terms that can have **significant financial consequences** for customers; and

(Almost) Nobody Reads T&Cs!

Terms of Use

You explicitly understand and acknowledge that the treatment of Digital Assets in the event of such an insolvency proceeding is unsettled, not guaranteed, and may result in [...] you being treated as an unsecured creditor and/or the total loss of any and all Digital Assets reflected in your Celsius Account...

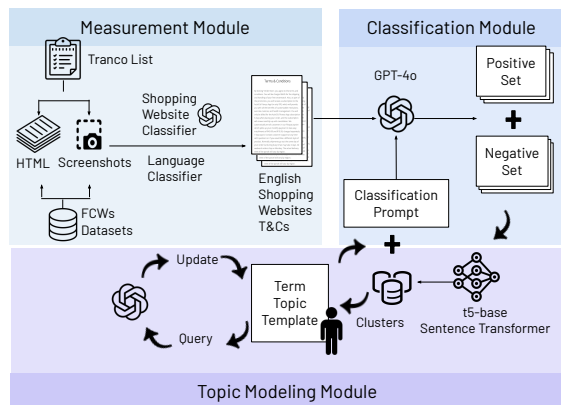
Section 4B, Terms of Use, from Celsius, a crypto company bankrupt in 2022.

The judge, Martin Glenn, found that Celsius's **terms of use** — the lengthy contracts that many websites publish but few consumers read — meant “the cryptocurrency assets became Celsius's property.”

“Bad news for thousands of crypto investors: They don't own their accounts”, The Washington Post, Jan 5, 2023.

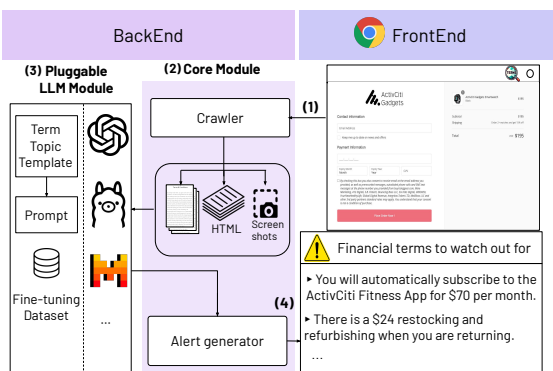
2. Measure, Understand, Topic Model, and Detect Unfavorable Financial Terms at Scale

2.1 TermMiner: Data Collection and Topic Modeling Pipeline



TermMiner collects English T&Cs from shopping websites, classifies terms into binary categories, and clusters terms to identify topics through manual inspection, GPT-4o, and iterative snowball sampling.

2.2 TermLens: Unfavorable Financial Term Detection System



TermLens: The plugin (1) sends the page URL to the backend, (2) retrieves T&Cs and website data (HTML, screenshots, etc.), (3) analyzes them to identify *unfavorable financial terms* using the pluggable LLM module, and (4) displays alerts to warn users.

3. Unfavorable Financial Terms Taxonomy

To evaluate financial unfavorable terms, we reference **Section 5 of the FTC Act**.

We report **22 types** of unfavorable financial terms from **4 categories**, representing the most prominent types among **1.9 million terms** from 8,979 shopping websites.

Category	Example	Types
Purchase and Billing	By clicking "Order Now", you agree to the terms and conditions. You will be charged \$6.85 for the shipping and handling of your free smartwatch. Also, as part of the promotion, you will receive a subscription to the FitHabit Fitness App for only \$86.	6
Post-Purchase	Refund Policy: Refunds are not in cash but in the form of a "coupon".	10
Termination and Account Recovery	Please be noted that if your account is dormant for a period of 12 consecutive calendar months or longer, ..., any amounts in your account's balance, including any outstanding fees owed to you, shall be considered as forfeited and shall be fully deducted to Appnext.	3
Legal	You hereby waive California Civil Code Section 1542. You hereby waive any similar provision in law, regulation, or code.	3

* All examples are extracted as-is from real-world shopping websites.

4. Findings

4.1 Evaluation: Main Takeaways

Context Helps: Including taxonomy in the prompt gives zero-shot term classification TPR a 4.4% to 27.4% boost, and F1 score a 4.5% to 21.1% boost.

Fine-tuning Helps: Fine-tuned GPT-4o beats zero-shot and fine-tuned GPT-3.5-Turbo, Llama 3, and Gemma 2, with TPR=92.1% and FPR=2.3%.

4.2 Large Scale Measurement on Tranco List Top 100K: Examples

For this service, National Park Reservations charges a **10% non-refundable reservation fee** based on the total dollar amount of reservations made. This reservation fee will be billed separately to your credit card and will be billed under the memo "National Park Reservations".

Jun 5, 2024

This company hide their 10% non-refundable service fee and is very deceptive about it. In their booking page, there's no mention about the 10% fee at all. And they name themselves National Parks Reservations to make people think they are affiliated with NPS.

If an Account has been closed [...] Fees relating to ongoing **management of inactive accounts will also continue to be charged** following closure of your Account. This provision shall survive termination of the relationship between you and us.

★ ★ ★ ★ ★

They steal my money and block me

They steal my money and block my account without a reason Dont put ur money on Neteller NEVER!

Unfavorable financial terms have real-world consequences, harming consumers

5. Conclusion & Contribution

- TermMiner:** Data collection and Topic Modeling pipeline for online policies.
- Large-Scale T&Cs Analysis:** 😊 **ShopTC-100K dataset**
✓ 100K+ popular websites → 8,000+ shopping sites (1.8M terms)
- Unfavorable Financial Term Taxonomy**
✓ Develop a taxonomy of 22 term types across 4 major categories.
- Unfavorable Financial Term Detection**
✓ TermLens, a LLM-based unfavorable financial term detection framework.
- Large Scale Measurement Study** (Shopping website from tranco top 100K)
💡 Only 0.5% of terms are unfavorable, but about 40% of websites have them!
💡 More prevalent on less popular websites.

