Advanced Data Analytics (CSE-AIML) UE23AM343AB1

Course Project One Pager

Team Details

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Project Title

Cross-Domain Analytics Transfer: A Systematic Framework for Customer Segmentation Model Adaptation

Possible Dataset and source

BigBasket / JioMart Product and Catalog Data – Rich e-commerce dataset containing grocery and household product categories, prices, and customer interactions. It supports **product-category domain shift experiments** (e.g., grocery vs household vs personal care).
*Source:*Big basket Dataset

UK Online Retail - https://www.kaggle.com/datasets/carrie1/ecommerce-data
Transaction-Level Data: Real customer purchase patterns , **RFM Analysis Ready**: Has customer IDs, dates, monetary values, **Temporal Patterns**: Time-series data for seasonal analysis. **Geographic Split**: UK dataset has country-wise splits, **Customer Demographics**: Age, gender, income for segmentation

Pan-Indian Consumer Transaction Dataset (IndiaTransactMultiFacet2024) – A large-scale dataset capturing consumer transactions across multiple Indian states and regions. This dataset enables **geography/market-based domain adaptation experiments** by splitting customers across Tier-1 vs Tier-2 cities or state-wise segments.
Source: Pan-Indian Consumer Transaction Dataset

Uniqueness of the topic

The proposed uniqueness of our work lies in designing **domain-aware transferability metrics** that can predict, ahead of training, whether customer segmentation models trained in one product category or market can be effectively transferred to another. Existing approaches in transfer learning are largely task-agnostic or depend on labeled target data, which is often scarce in segmentation tasks. By focusing on lightweight, data-efficient indicators tailored to segmentation, we aim to provide a practical framework that helps businesses decide *when* transferring existing segmentation models is worthwhile, thereby reducing redundant modeling effort and accelerating insights in new domains.

Your Learning goal

Learning Goals

- **Technical**: Master transfer learning, fine-tuning, domain adaptation; skilled in customer analytics (RFM, clustering), hypothesis testing, and Python ML stack (scikit-learn, pandas, TensorFlow/PyTorch).

- **Business Analytics**: Understand customer behavior across industries, apply ROI-driven decision frameworks, engineer cross-domain features, and deploy models for measurable impact.

- **R&D**: Design experiments, conduct literature reviews, build decision-support frameworks, and present insights effectively.

- **Project Management**: Manage multi-dataset experiments, collaborate on analytical frameworks, and bridge technical insights with business needs.

Reference paper, if any (provide the URL)

No	Title	Link
1	A Survey on Deep Transfer Learning	https://arxiv.org/pdf/1808.01974.pdf
2	Domain Adaptation via Transfer Component Analysis	https://ieeexplore.ieee.org/document/5640675
3	How can algorithms help in segmenting users and customers?	https://link.springer.com/article/10.1057/s41270-023-00235-5
4	Domain Adaptation: Challenges, Methods, Datasets	https://ieeexplore.ieee.org/document/10017290
5	Customer Segmentation using Machine Learning and Transfer Learning	https://www.researchgate.net/publication/377945066_Customer_Segmentation
6	Adaptive Domain Interest Network for Multi-domain Recommendation	https://dl.acm.org/doi/10.1145/3511808.3557137