Games classifier

Team 9

Members: Julia Cygan, Borys Adamiak, Patryk Flama
Supervisor: Marek Adamczyk

UWr

February 11, 2025

https://github.com/PatrykFlama/GameClassifier

Goal and motivation

Use case example:
Imagine that you run a online game store where users can add their games to your library. Instead of manually checking if user tagged correctly the game, you can use our model to do that job for you.

Goal:
We want to be able to automatically assign tags (or genres) to games, based on their (text) description.

Additionally, in aspect of ML project, we want to make a small comparison of different models and methods for solving such multilabel classification problem.

Info about the dataset

Steam has its own official API, from which we downloaded games, their descriptions, tags and genres. That resulted in a bit over *200'000* games.

To clean the data we:

- Converted descriptions to alphanumeric lowercase
- Removed html tags
- Removed empty descriptions or tags
- (optional) Removed tags/genres that occured at most n times

After that we ended up with a dataset of size around *50'000* games and *400* unique tags or *100* unique genres.

Info about the dataset

	game_id	name	description	tags
0	1418990	Unicorns on Unicycles	turn your horns into swords in this wacky and ...	{'Local Multiplayer': 267, 'Physics': 253, 'Ex...
1	1419040	Road Maintenance Simulator	experience the everyday life in a german stree...	{'Simulation': 97, 'Casual': 91, 'Indie': 88, ...
2	1419060	Retchid	roadmapabout the gameretchid is an immersive a...	{'Exploration': 195, 'FPS': 190, 'Shoot 'Em Up...
3	1419070	Mython Island	mython island is a monster catching rpg featur...	{'Creature Collector': 144, 'RPG': 139, 'Turn-...
4	1419100	The Unexpected Quest Prologue	get the full game hereabout the gamean adventu...	{'Free to Play': 139, 'Simulation': 121, 'City...

(31328, 4)

Data preprocessing

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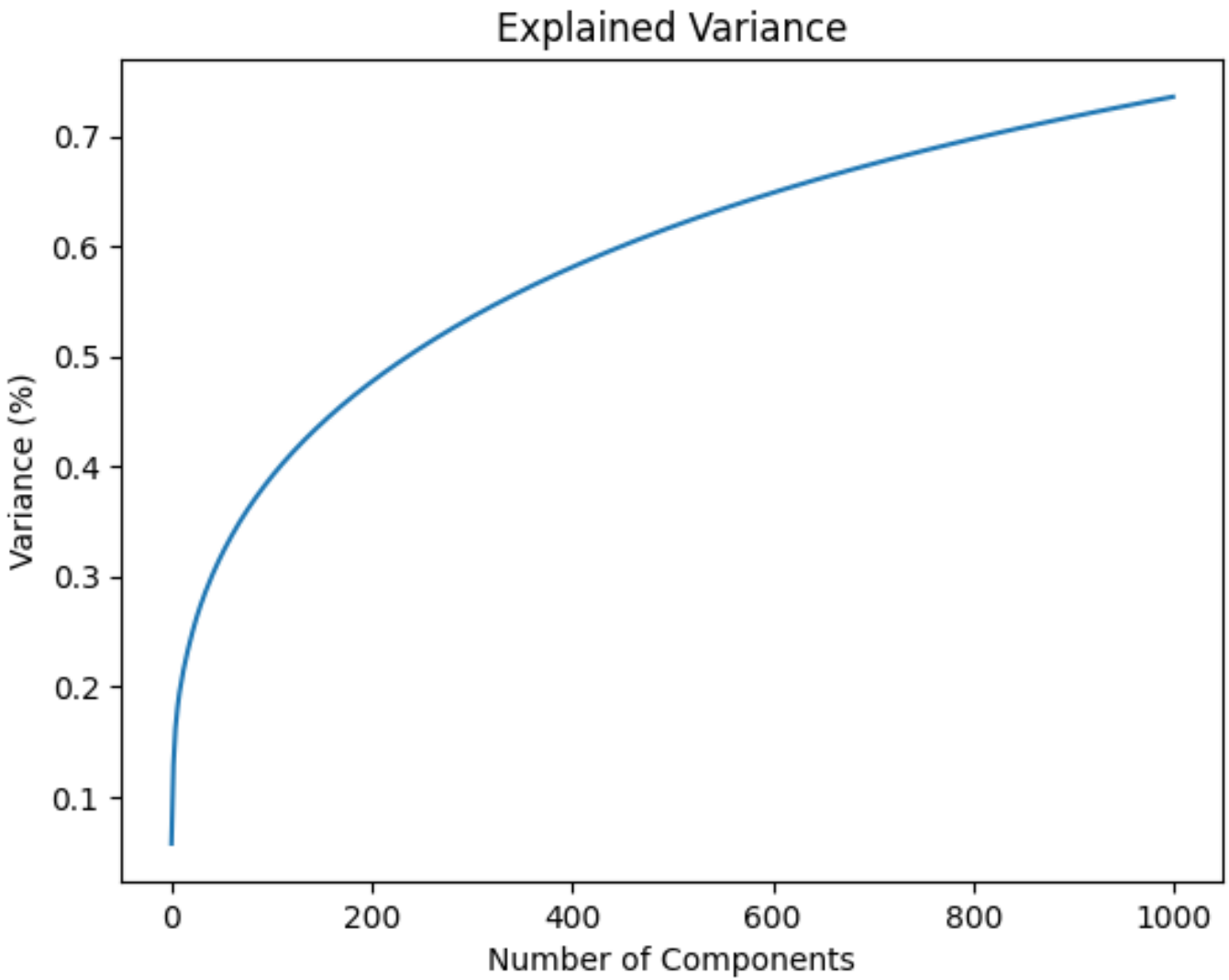
For input preprocessing we tried:

- Bag of Words
- TF-IDF
- Hashing vectorizer

We decided to check if there are some patterns in the data that we can use to improve our model.

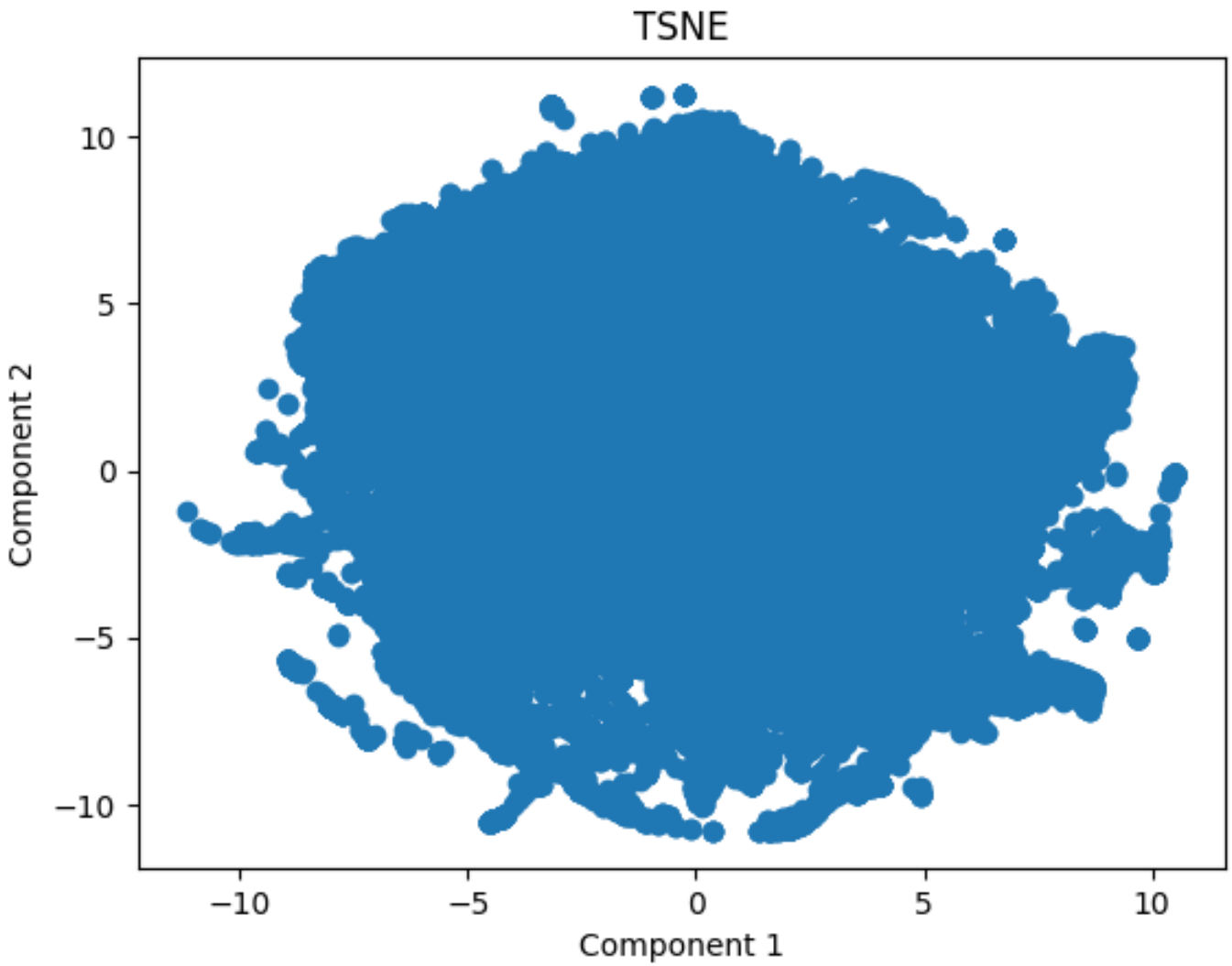
Data preprocessing

Figure: PCA analysis on Bag of Words



Data preprocessing

Figure: t-SNE 300 iterations + PCA to 500 on Bag of Words



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- Support Vector Machine
  Interesting concept

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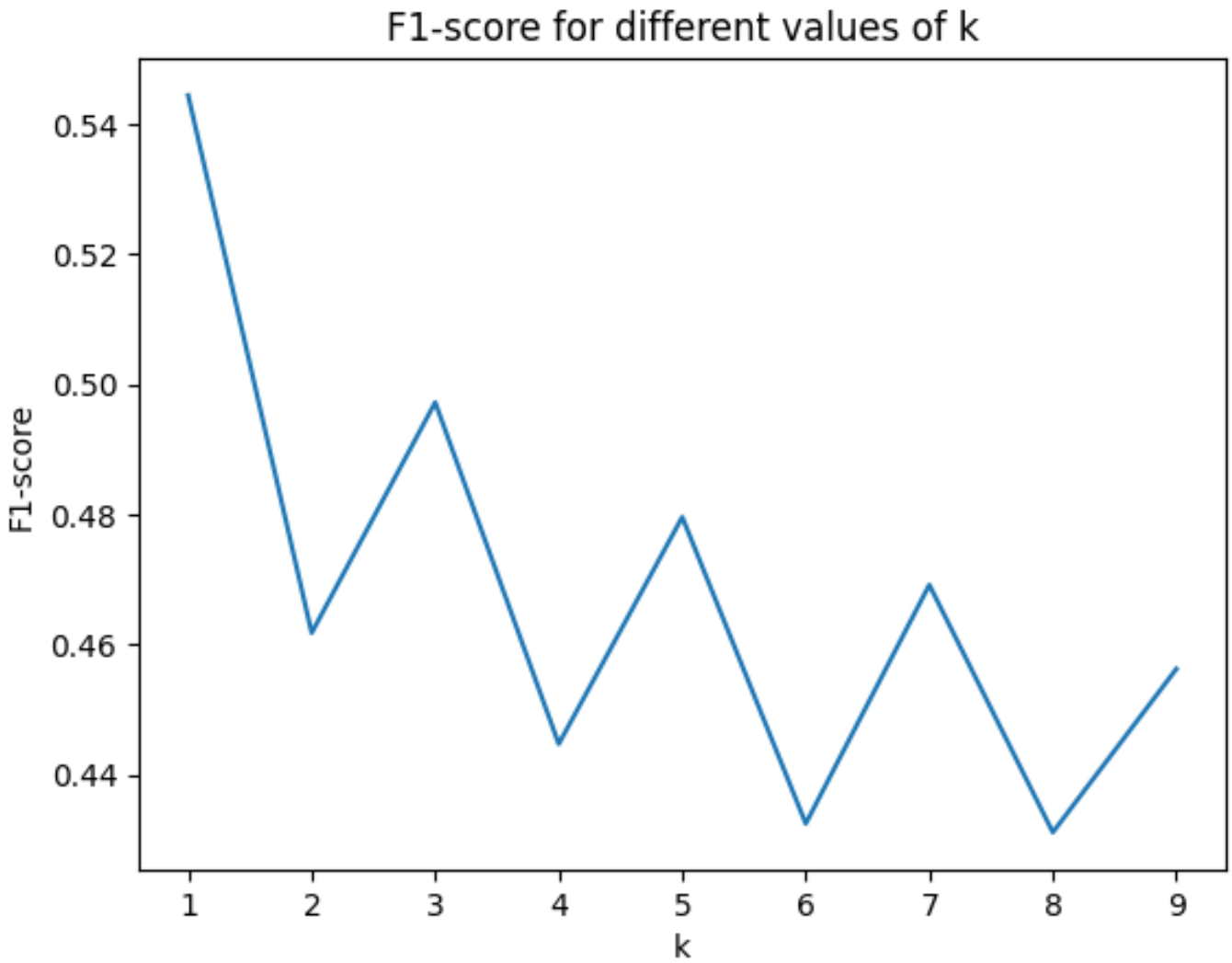
- Hamming loss
  How would a loss function compare to score functions

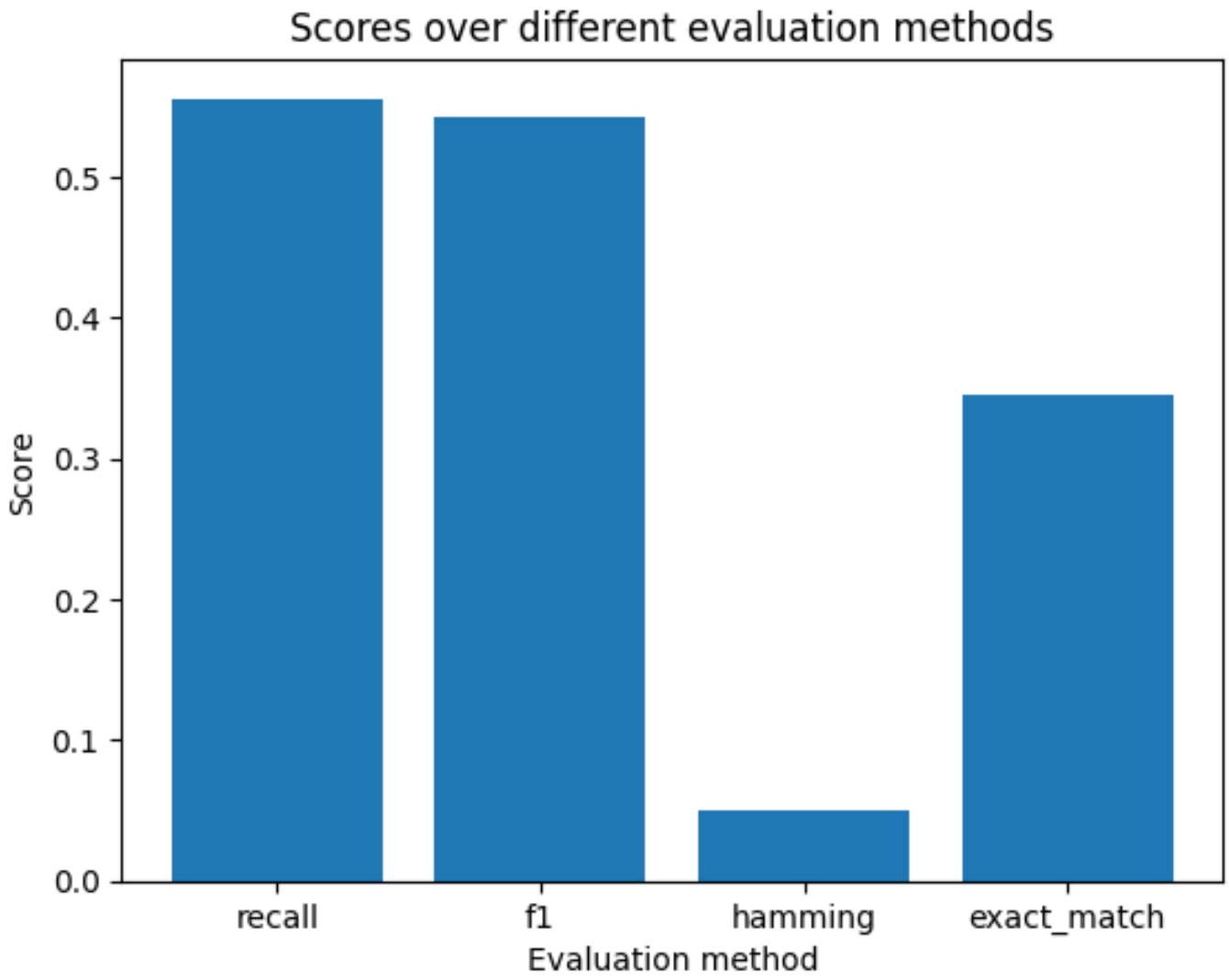
Results - KNN

Figure: Different number of neighbors

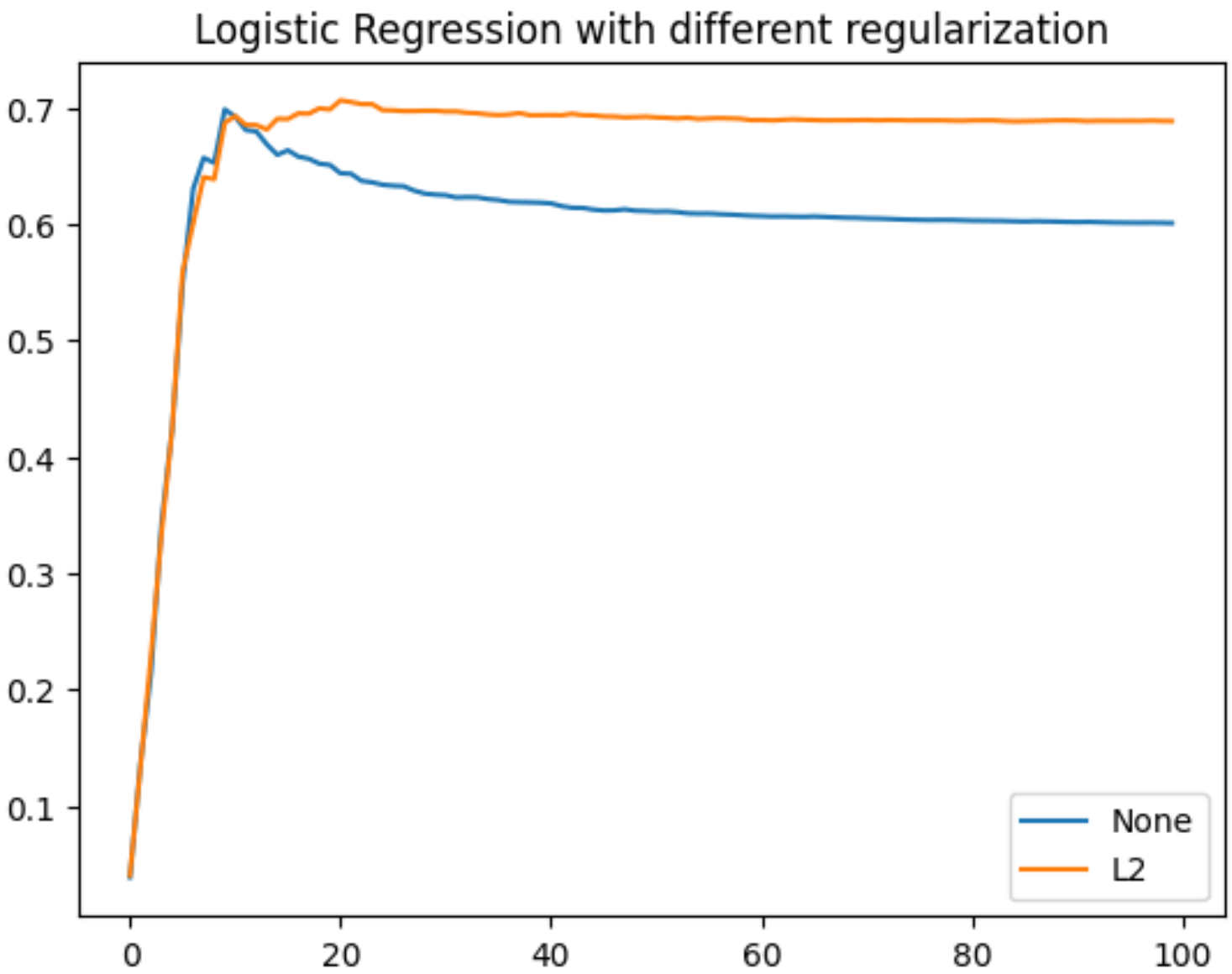


Results - KNN

Figure: Comparison of evaluations



Results - Logistic Regression



Results - Decision Tree

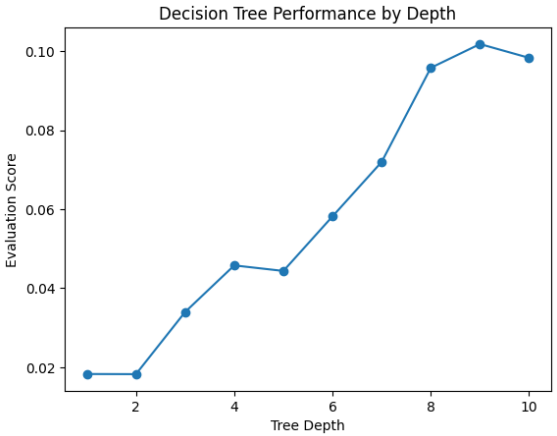


Figure: Exact match

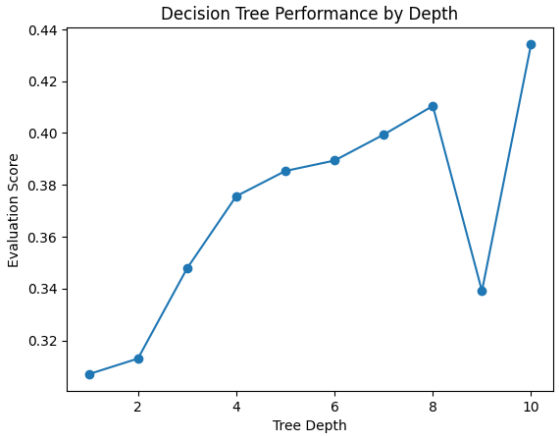


Figure: F1-score

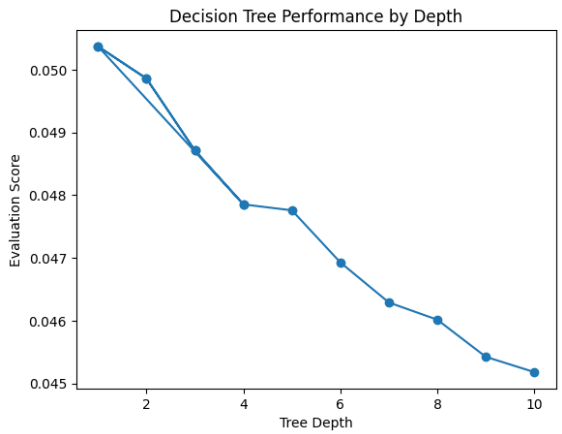


Figure: Hamming loss

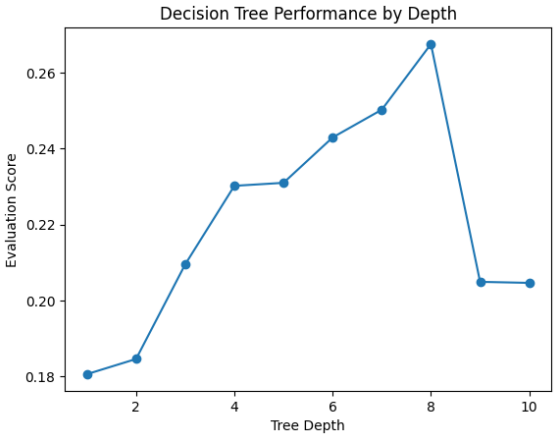


Figure: Intersection

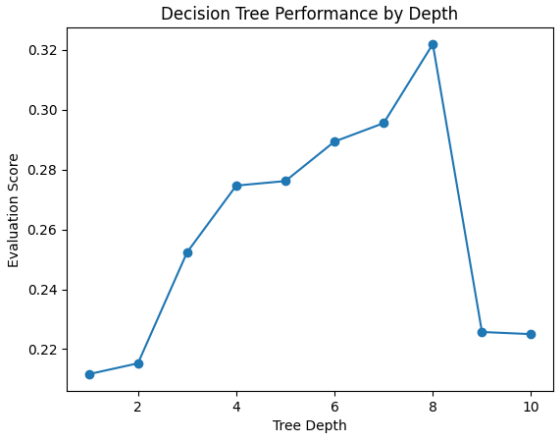


Figure: Recall

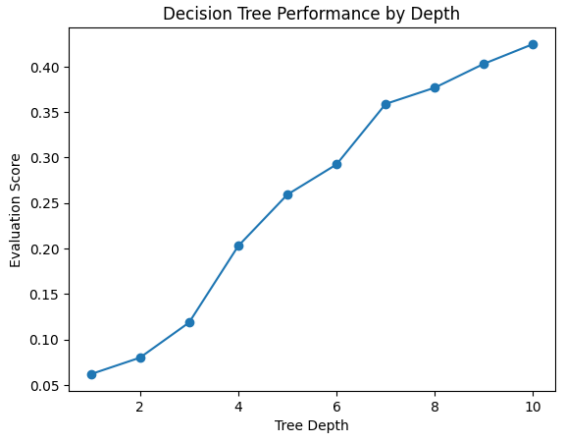
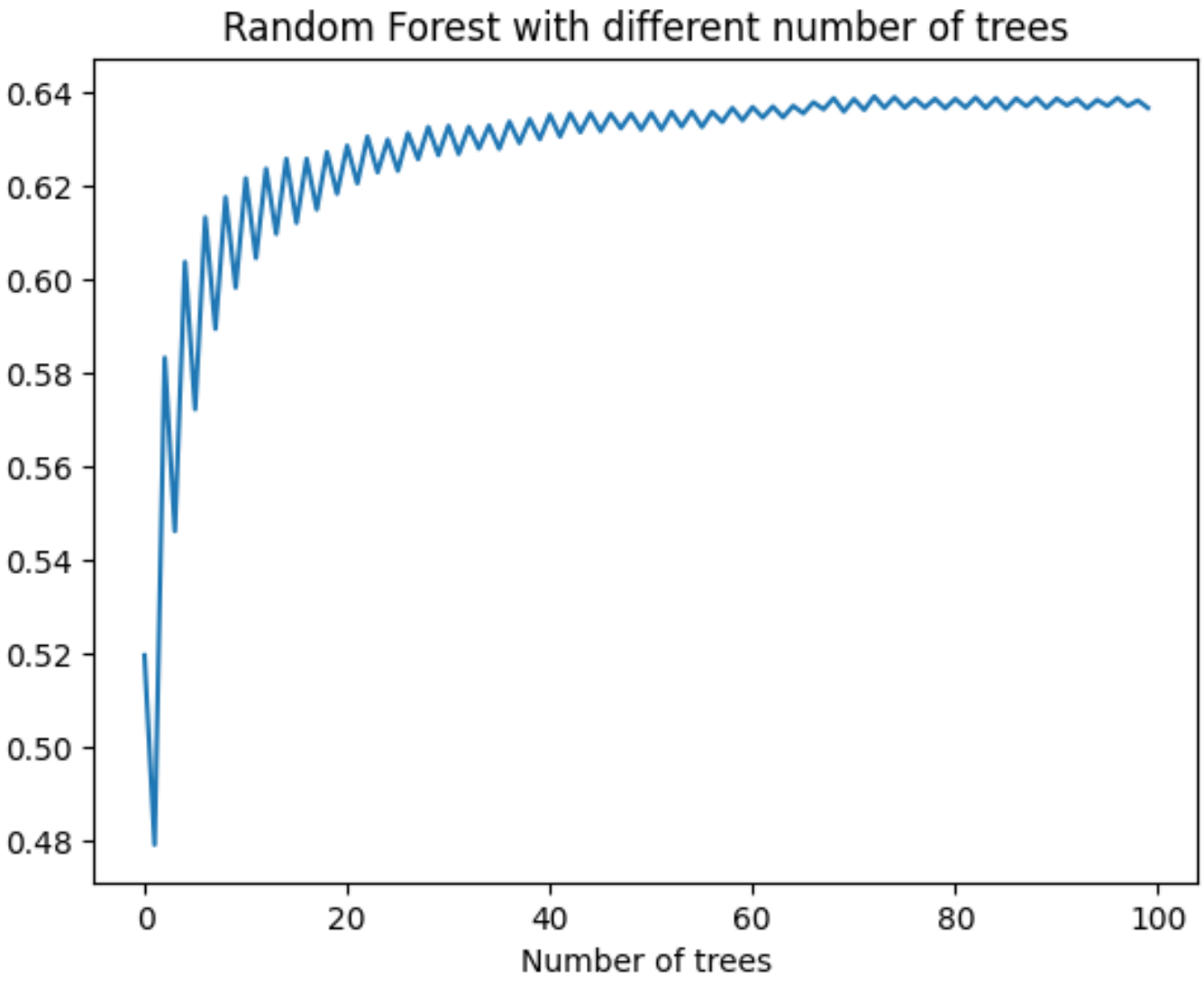


Figure: Precision

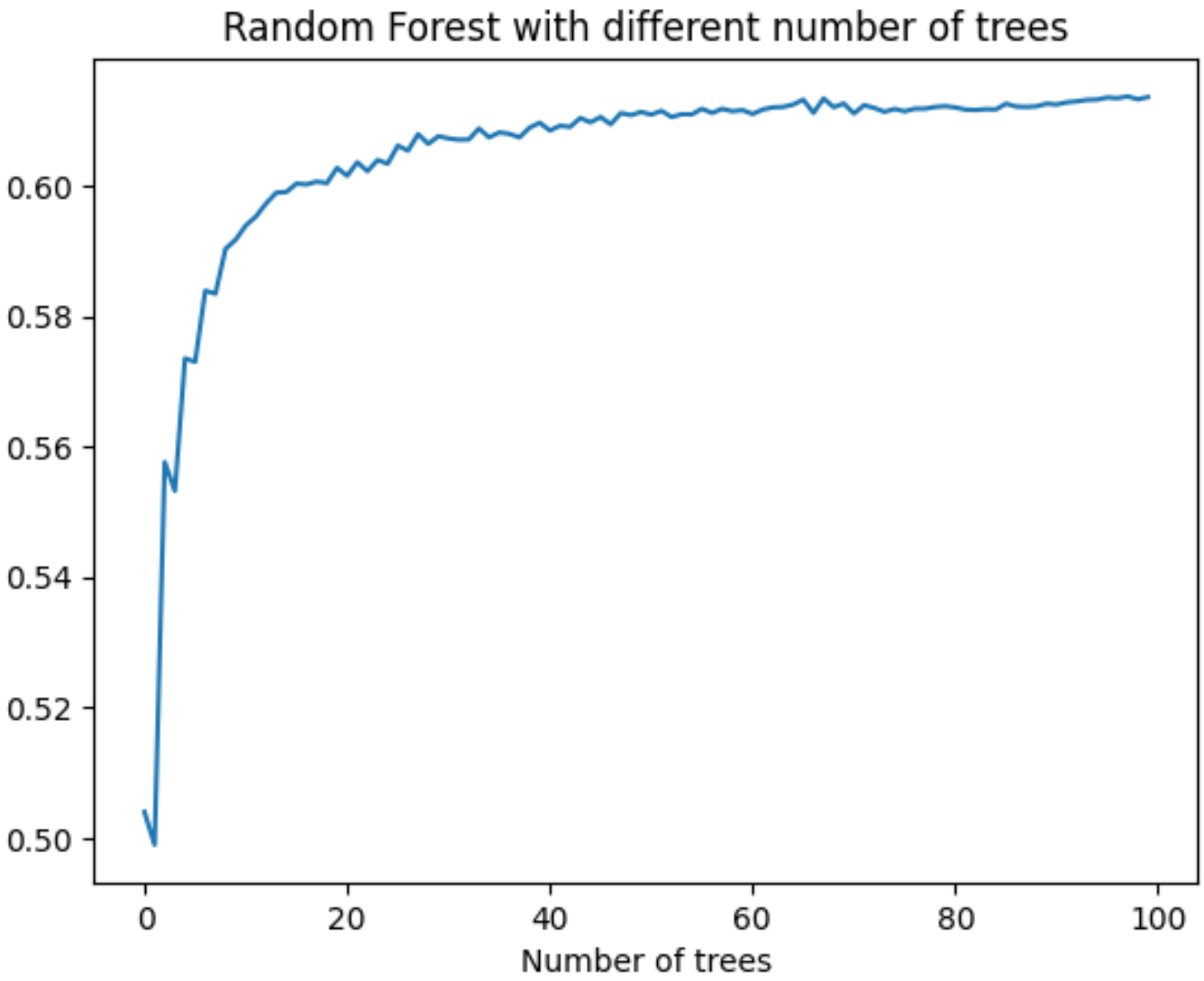
Results - Random Forest

Figure: Different number of trees, no depth limit



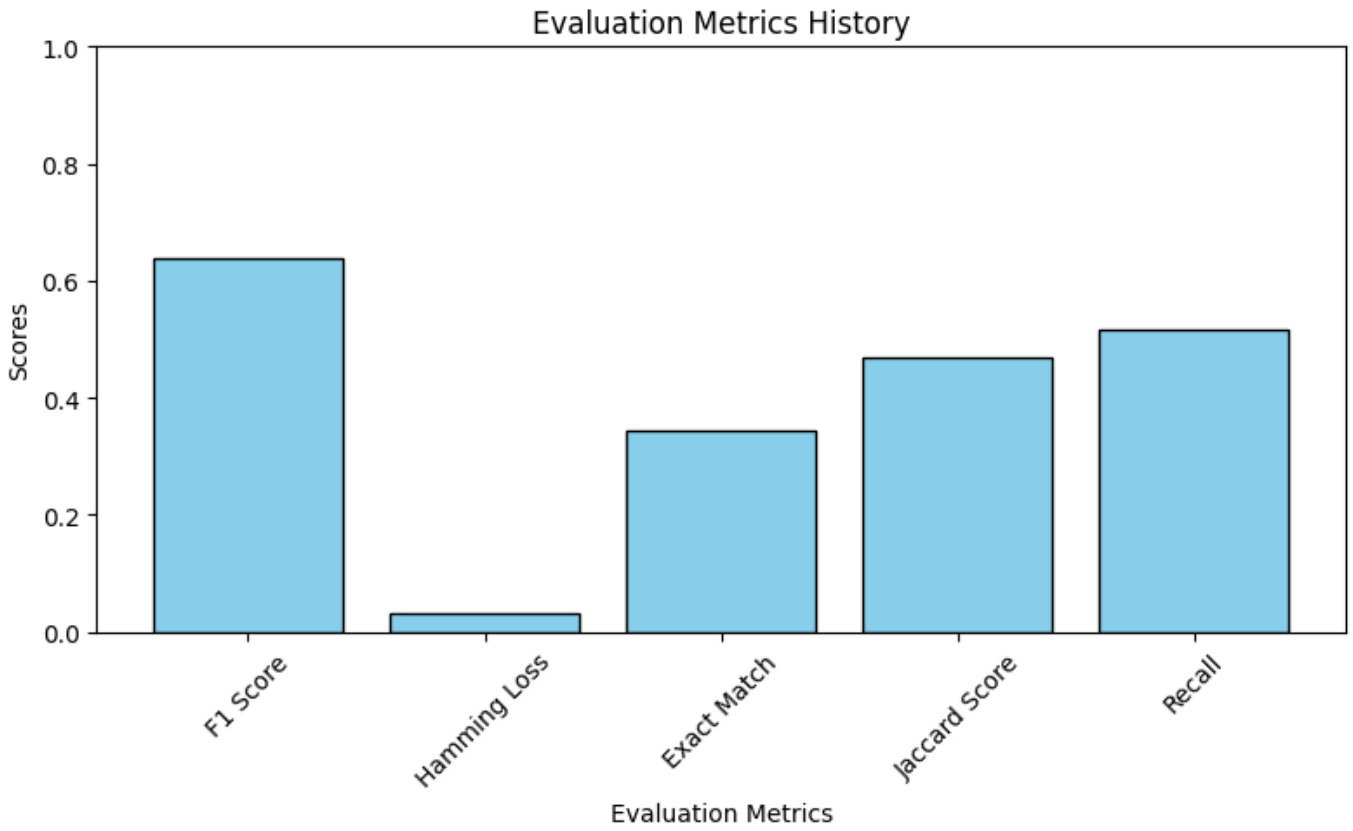
Results - Random Forest

Figure: Different number of trees, depth limited to 100

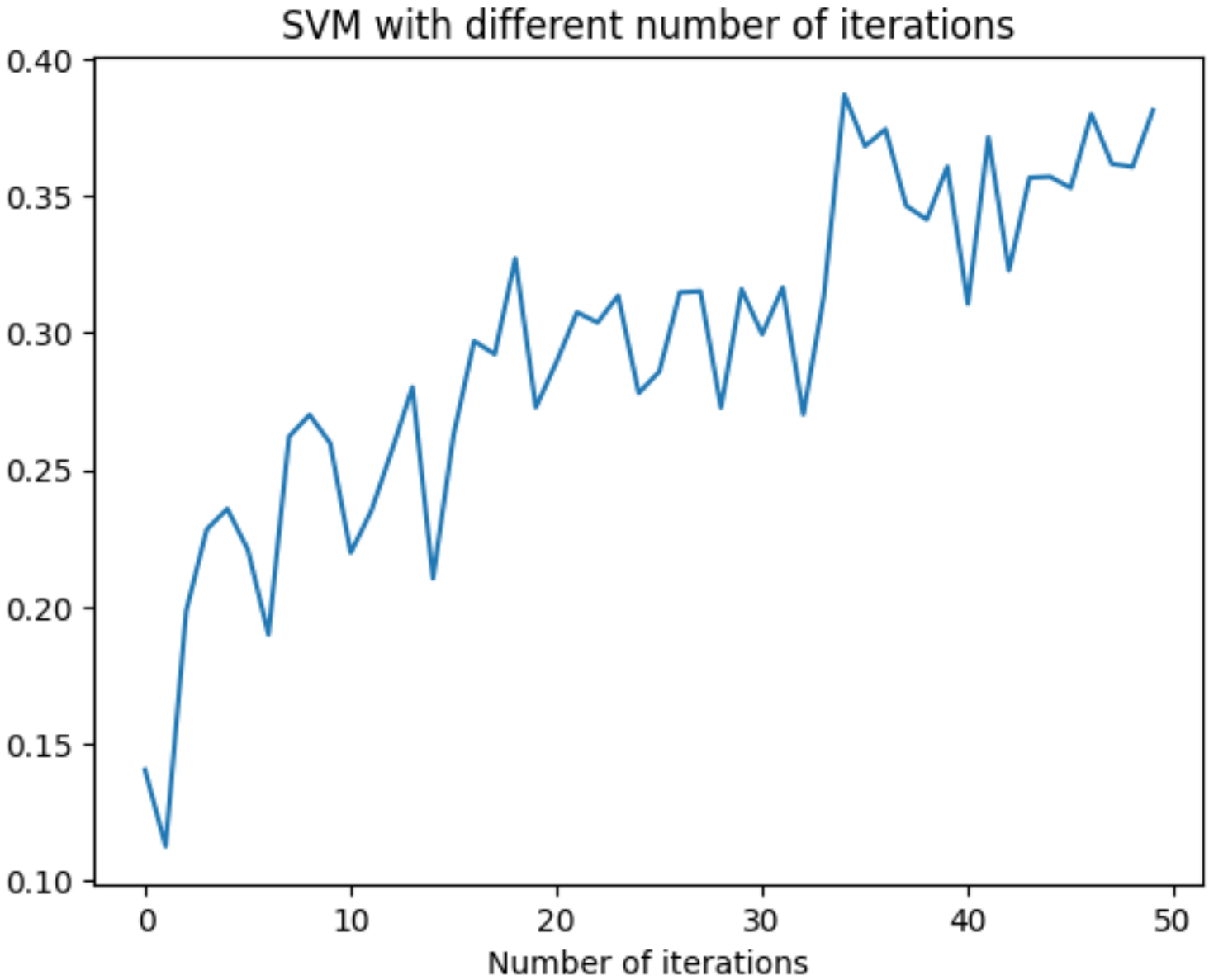


Results - Random Forest

Figure: Evaluation comparison

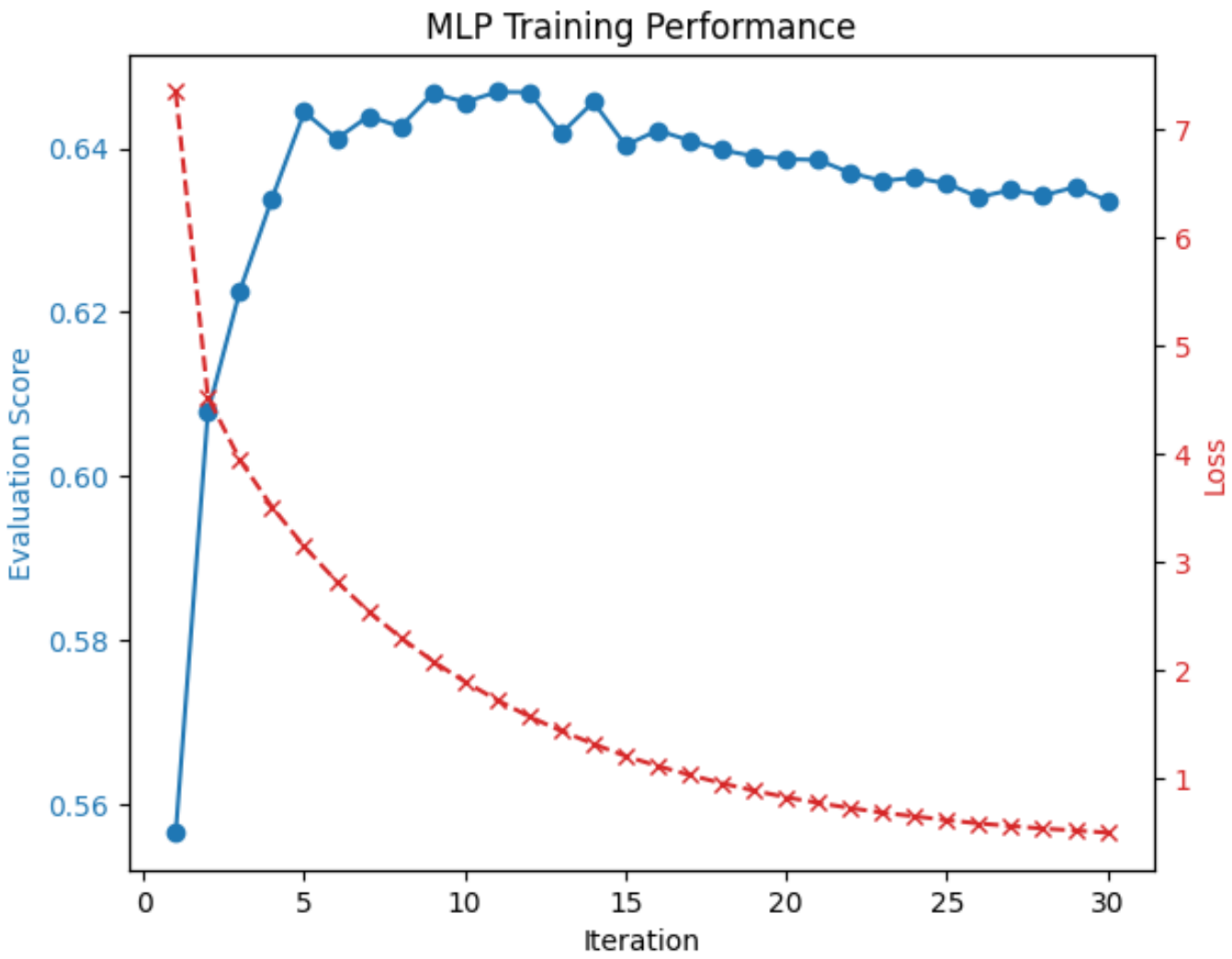


Results - Support Vector Machine



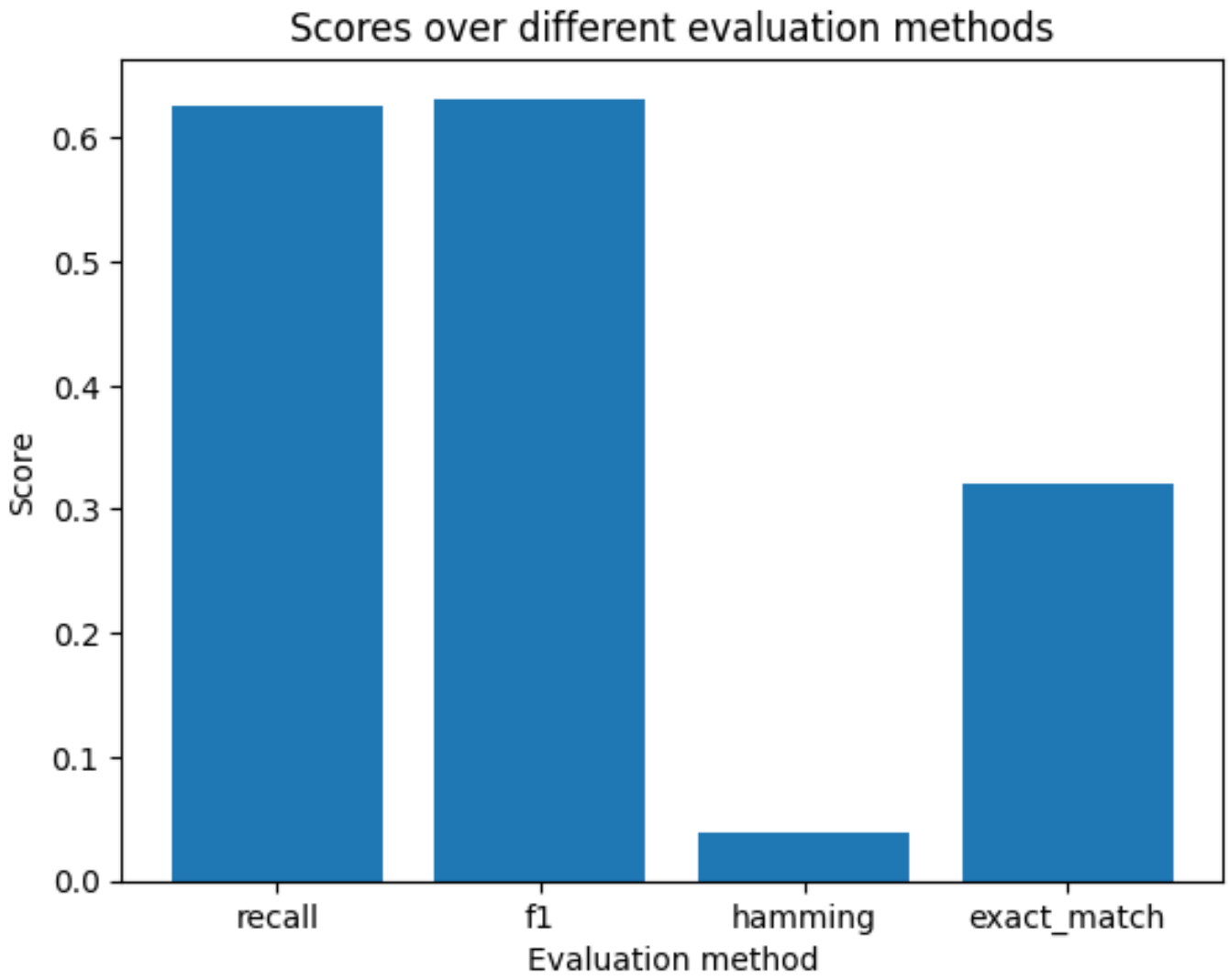
Results - Neural Network

Figure: Multilayer Perceptron



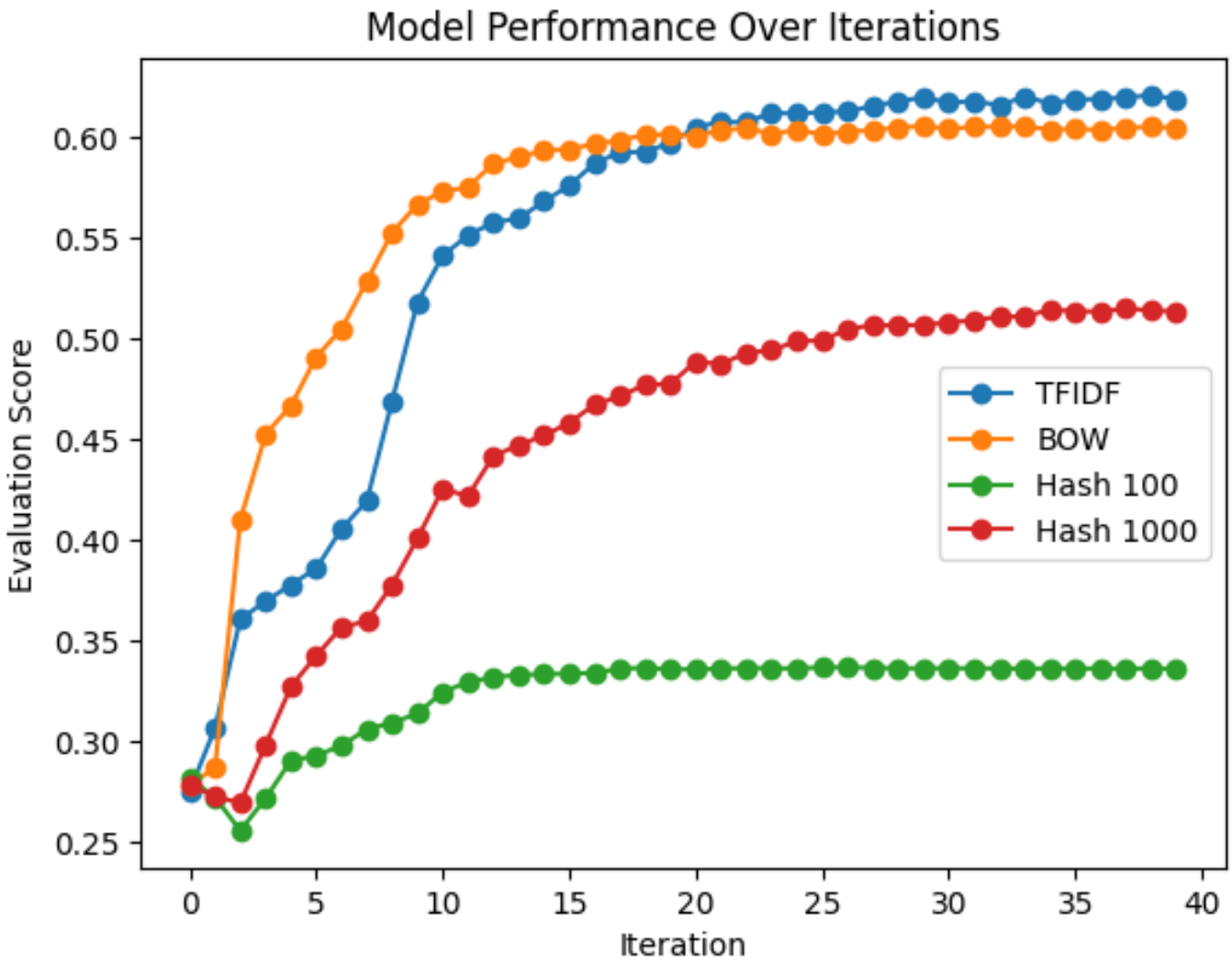
Results - Neural Network

Figure: Different evaluation methods



Input preprocessing

Figure: Logistic Regression, F1-score



Evaluation metrics

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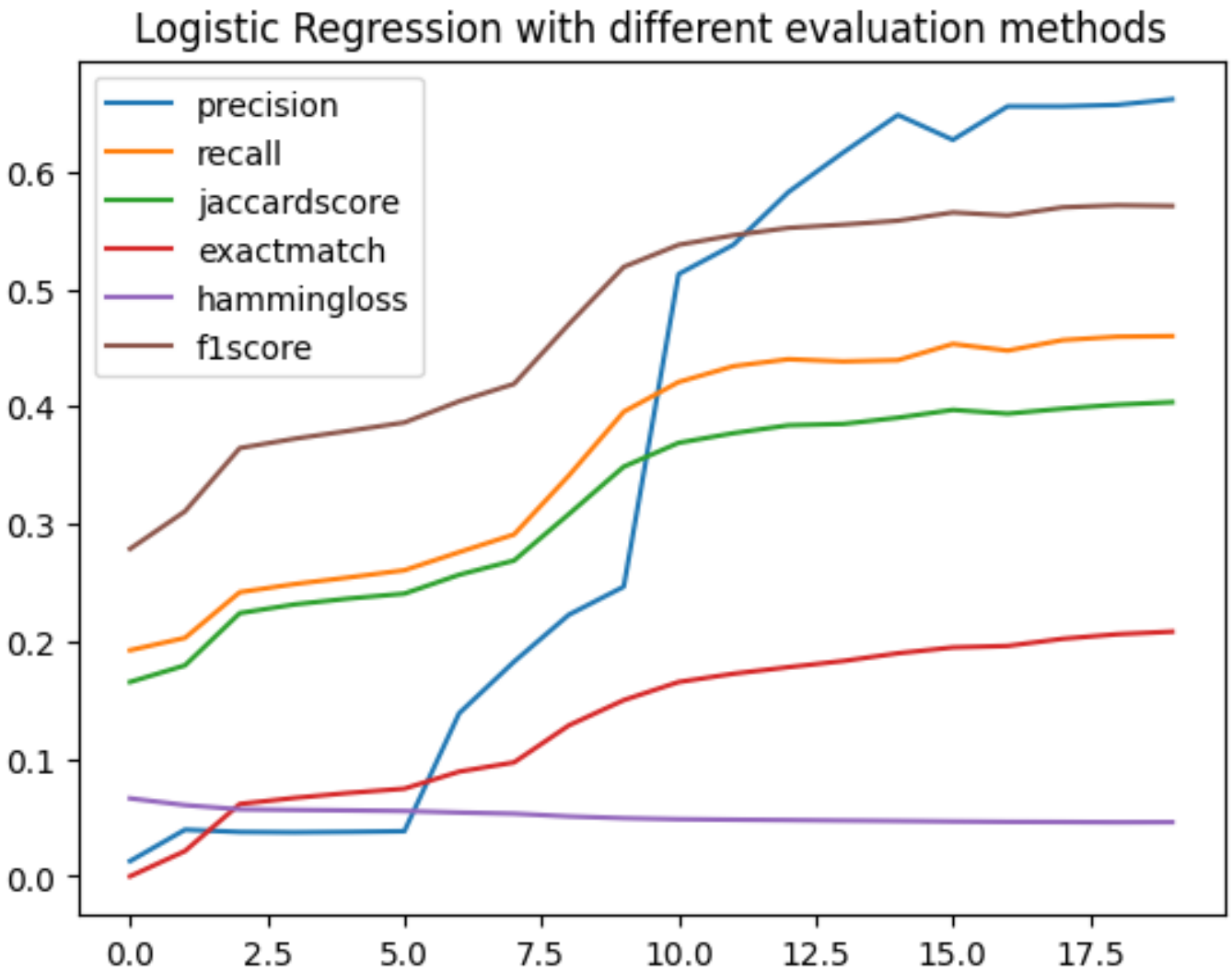
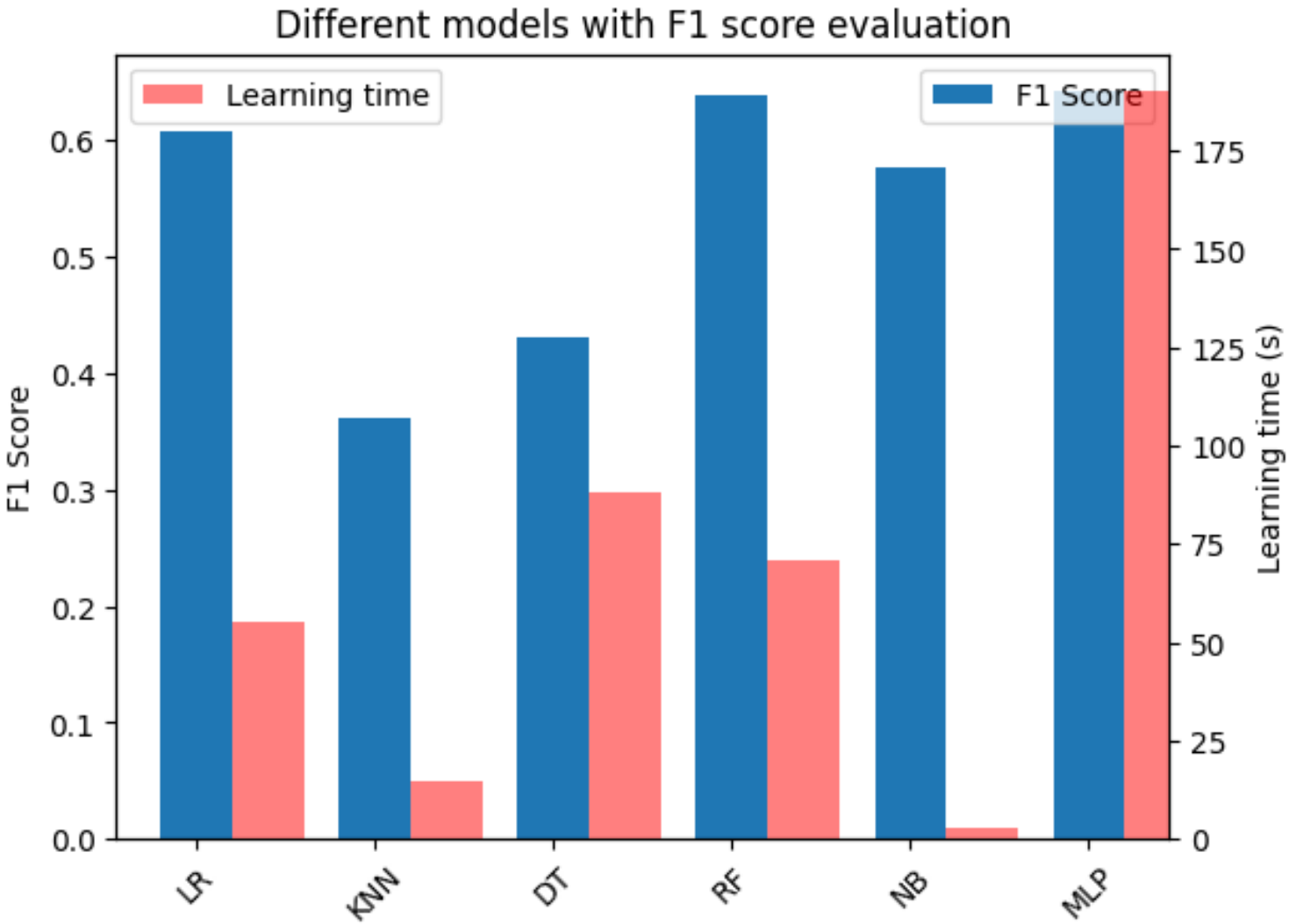


Models Comparison



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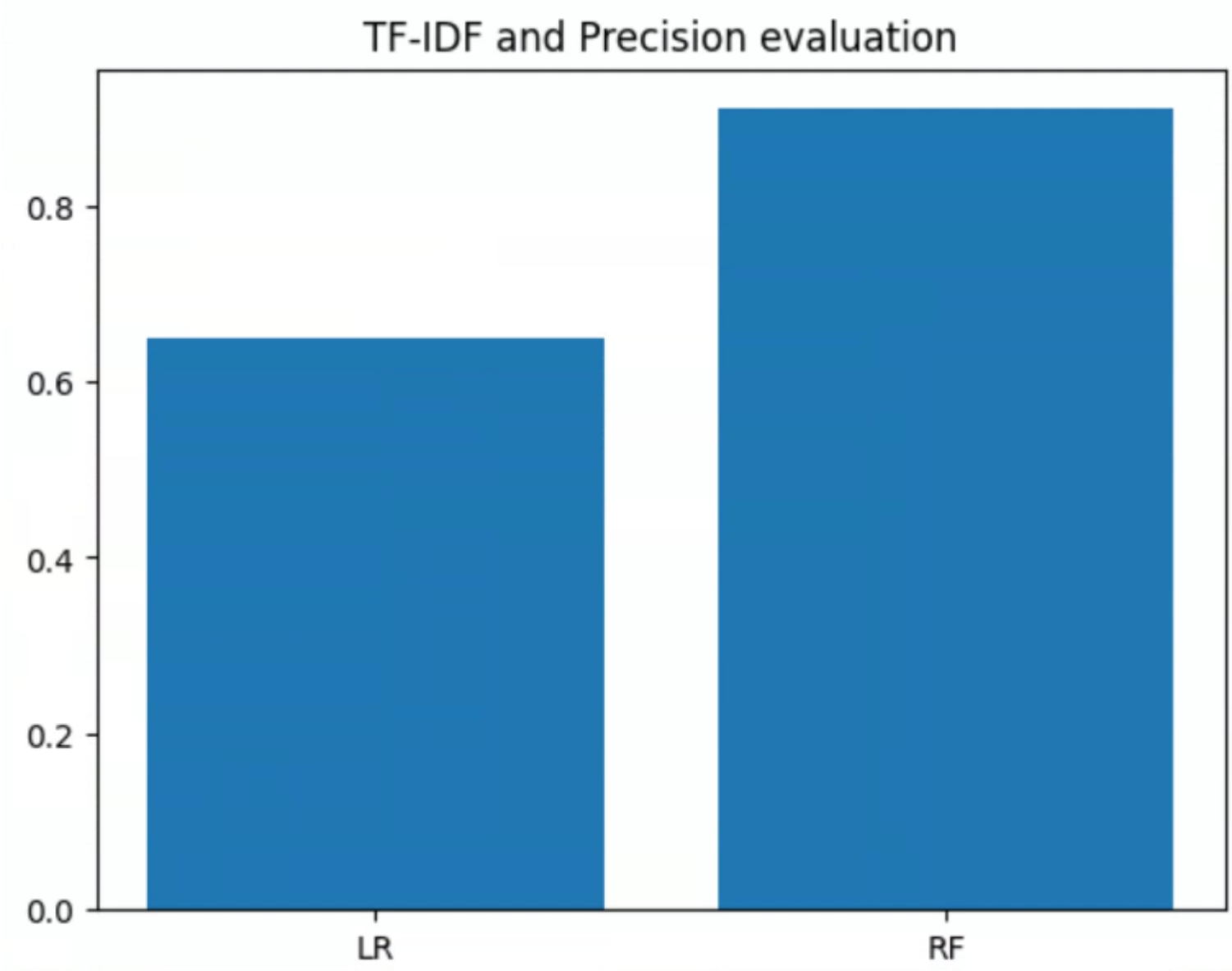

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- **Decision trees** were empirically proven (again) that they are not the best choice
- **SVM** did not perform too bad, nor too good
  we suspect that, based on how it works, it could **eventually** perform way better (but that would require a lot of time)