Collaborative Filter

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Dependence

- Python 2.7
  - Tensorflow 1.1
  - Keras 2

Run

- `predict_sub_txt.txt` is the final results I predicted
- Put `train_sub_txt.txt` in `data\`
- Run `ensemble.py`, generate `res.txt` in root directory

Project Structure

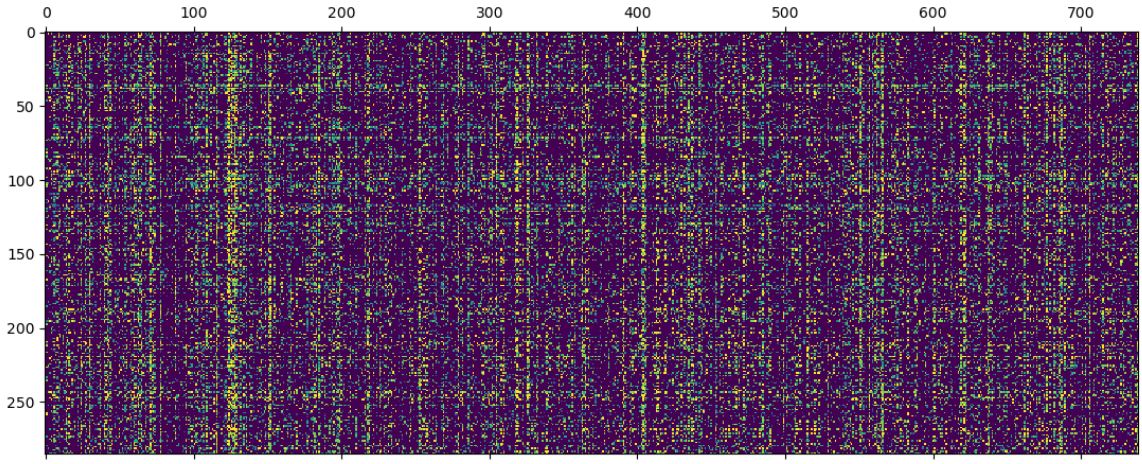
```
$ROOT
├── clean.sh
├── data
│   └── train_sub_txt.txt
├── README.md
└── src
    ├── config.py
    ├── data.py
    ├── ensemble.py
    ├── grid_search.py
    ├── logger.py
    ├── model.py
    └── utils.py
```

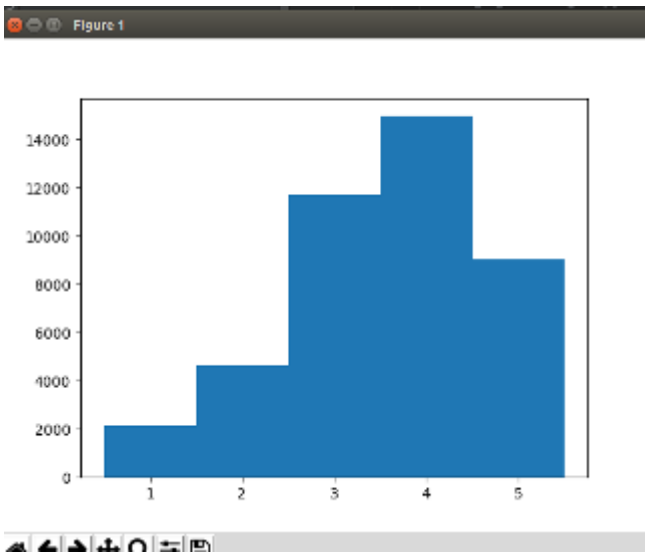
Method

- DeepCF re-implemented with reference to [2] and there are following modifications for our problem:

    - Turn it into classification problem rather than regression.
    - EarlyStop to avoid over fitting, rather than eject noise.
    - Others: Model Ensemble.
- Inherited Ideas:
    - Use history ratings as item's raw feature, enable to generalize better to unseen items. with at least 10 ratings. Because the input is raw feature rather than user index.
    - Adapt In-Matrix prediction, split train: test= 9:1, no overlapping between train and test data.
    - Others: Shuffle and Clean Data, Grid Search.

Some Visualizations:

- After Remove Item less than 10.7 ratings, and shuffle User/Item index:
    - 

- Data Distribution is not balanced, so I tried to augment the unbalanced data, but in the future work I may use on-line hard example mining instead.
    - 

- After grid search for latent dim of SVD, I choose 100

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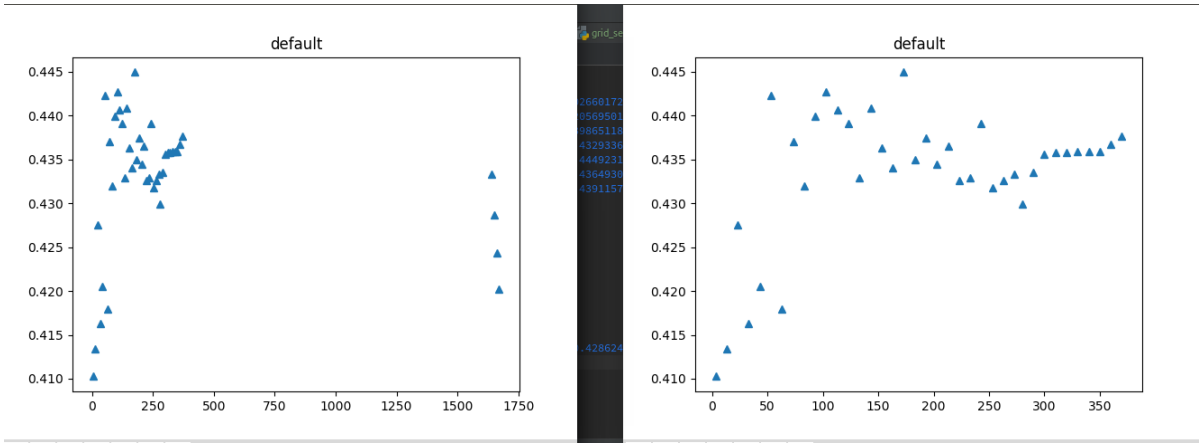

- From grid search result for Deep CF, we can see severe over-fitting phenomenon
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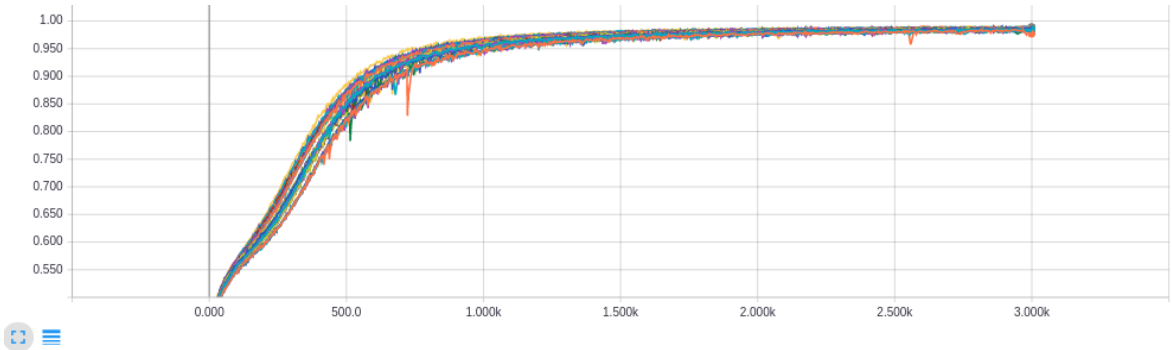

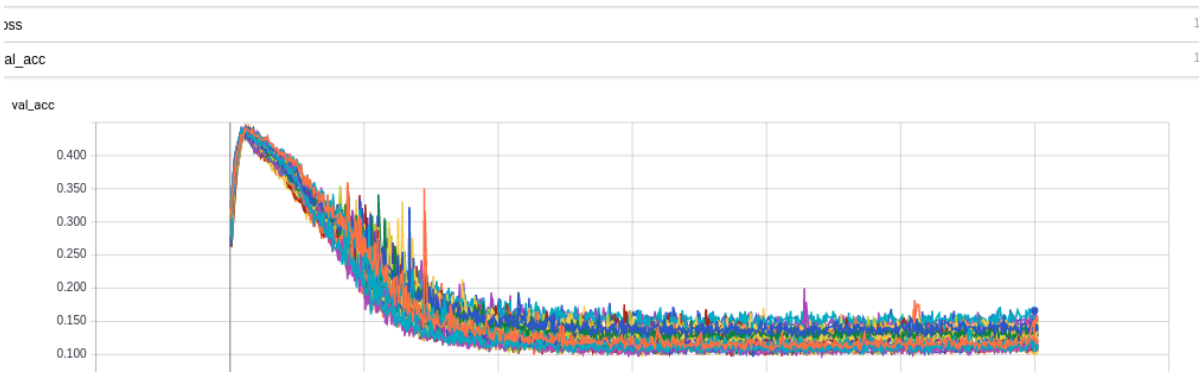

- So I have to apply early-stop, and I find although the accuracy of DeepCF(On Test Set) is just slightly higher than SVD. But after ensemble, final accuracy can higher than both.
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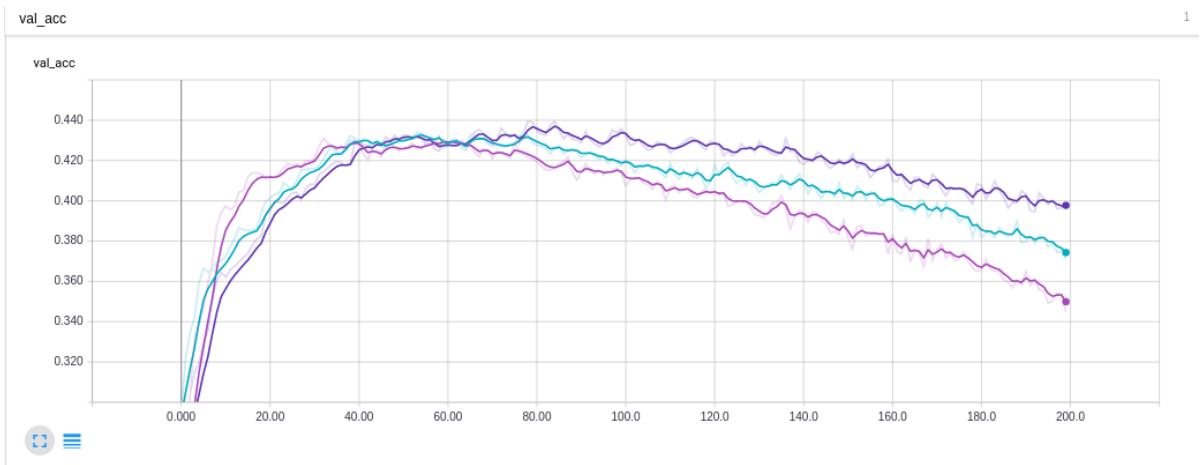
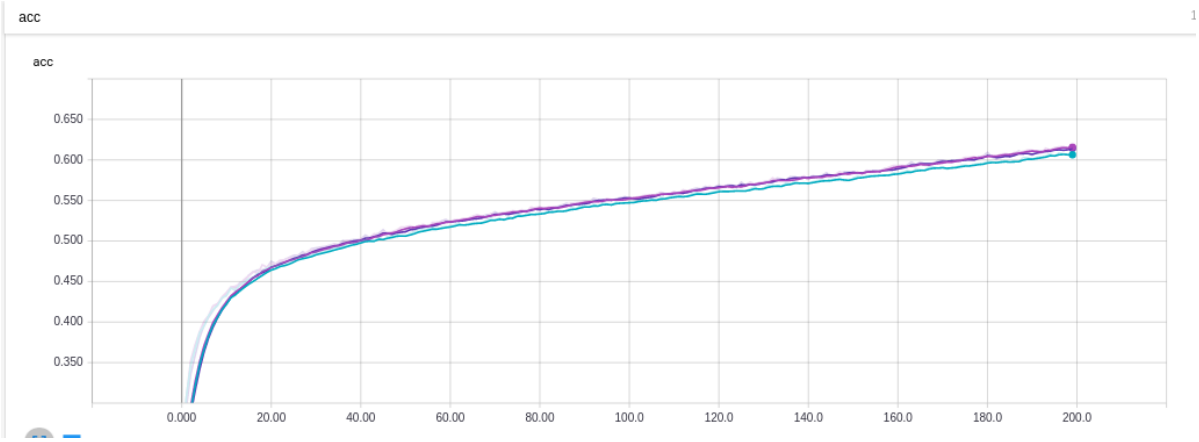
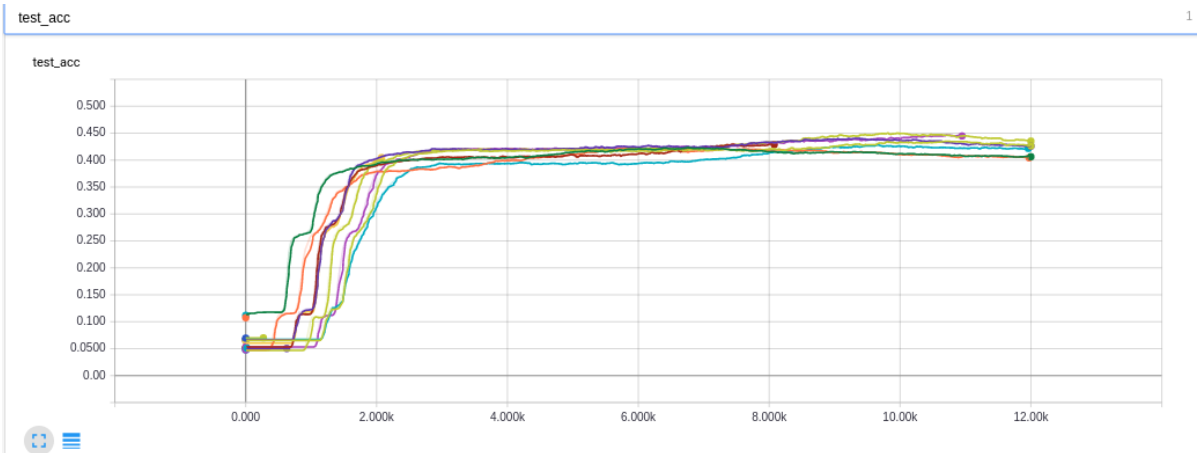
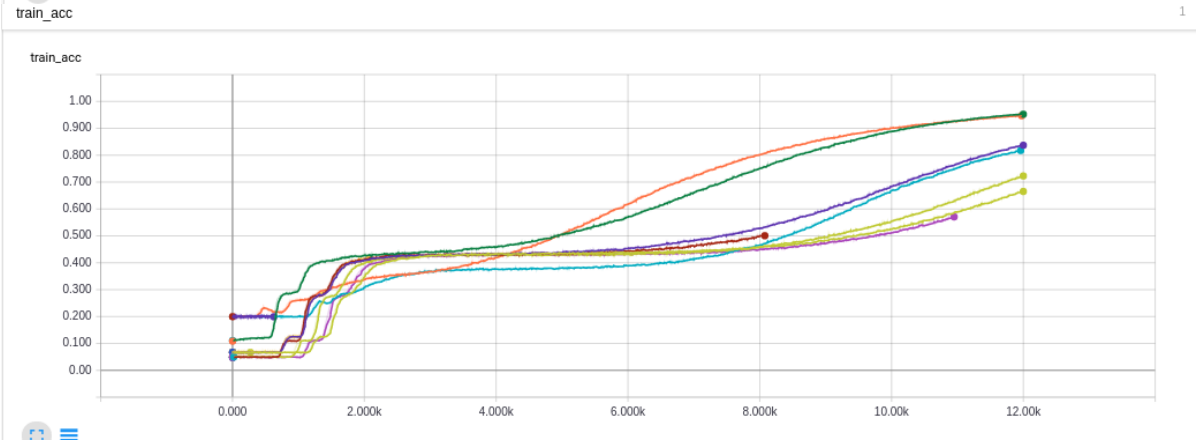


- 

- The train and test pattern of SVD, not severely suffer from over-fitting

- 

- 

TODO list

- [ ] On-line Hard Example Mining
- [x] Ensemble SVD and DaulNet
- [x] Whether to Early-stop/ Checkpoint
- [x] Whether to balance training dataset (Aug+Shuffle)
- [x] SVD
  - Grid search
    - latent dim / Dropout / regularize hyper-parameter
  - accuracy on the fly

- [x] DaulNet
    - Grid search
    - Last time result

	name	acc
0	svd_ynobsxylrc	0.438849
1	svd_mtmhmysqcu	0.436098
2	svd_lmtulnapux	0.435675
3	svd_faufhruaaq	0.434405
4	svd_uxvjuhhcnk	0.432234
5	deep_cf_cfrjuudupl	0.443504
6	deep_cf_kjjiarcqqq	0.444774
7	deep_cf_iwmyylneww	0.448159
8	deep_cf_imdhxyutfe	0.448295

Reference

- [1] `SVD` : https://github.com/mesuvash/TFMF/blob/master/TFMF.ipynb
- [2] `DaulNet` / `DeepCF` re-implement from Xiong Y, Lin D, Niu H, et al. Collaborative Deep Embedding via Dual Networks[J]. 2016. (With Some Modifications)