DigiEduHack Solution
Colombo - Making Learning Efficient
Challenge: Predicting Student Success (Predictive Learner Analytics)

A Novel Approach for Student Performance Prediction

A Novel Approach for Student Performance Prediction

Researches claim student performance is dependent on many factors. In contrast only a small portion of it is used in existing predictors. We exploit a novel technique - 'Federated Learning' to eliminate privacy and legal dependencies associated with the complete feature set.

Team: CrunchCode

Team members

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Solution Details

Solution description

We exploit the novel machine learning technique called Federated Learning to address this problem. In Federated Learning one's data is not shared across the internet. All the steps - training, testing and predicting happens in one's personal laptop/mobile.

Our solution provides the following benefits,

1. A more accurate student performance prediction
2. Models can be trained to predict probabilities associated with new events (ex: probability of winning a scholarship)
3. Exponential growth in education data mining
4. Service providers have a low risk of being accused of violating legal and privacy regulations

Solution context

Student performance prediction models have been a hot field in EDM[1] - Education Data Mining. However, the overall EDM has hit a pause due to the inability to extend the set of input features. Classical predictors take (C)GPA, attendance, marks for past assignment and tests. Researches have shown that a student's performance depends on many other factors (ex: demographic, psychographic details of a student) as well.

Due to privacy and legal regulations along with compliances like GDPR, the investment to a more accurate model is expensive.

[1] Del Río, César A., and Julio A. Pineda Insuasti. "Predicting academic performance in traditional environments at higher-education institutions using data mining: A review." *Ecos de la Academia* 2016.7 (2016).

[2] Conard, Maureen A. "Aptitude is not enough: How personality and behavior predict academic performance." *Journal of Research in Personality* 40.3 (2006): 339-346.

Solution target group

Immediate traget group is Students and parents, teachers are the secondary target group. Genarally anyone who needs a prediction can benefit from this solution

Solution impact

Users can predict new scenarios with our solution. For an example we go beyond predicting students GPA and make it possible to train our model to calculate the probability for a student to win a scholarship. The leverage that we have here is more features/data than an existing model. Other than this our solution provides the following benefits,

- A more accurate student performance prediction
- Models can be trained to predict probabilities associated with new events (ex: probability of winning a scholarship)
- Exponential growth in education data mining
- Service providers have a low risk of being accused of violating legal and privacy regulations

Solution tweet text

We say ahead of time- whether you commit suicide or not? How do we do that? You don't have to share a single data with us. Check our product @digimentor

Solution innovativeness

Classical predictors take (C)GPA, attendance, marks for past assignment and tests. But our model

can use personal data to predict more events.

Using the invention Federated learning we made an innovation. Instead of data to code we bring code to data, eliminating all the privacy, legal and security dependencies

Solution transferability

Genarally anyone who needs a prediction can benefit from this solution.

For example, A project manager can use our model to choose the employee who best suits for a new project. This is beacuse our model take many dynamic inputs to do predictions

Solution sustainability

Day by day new privacy policies are applied such as GDPR and hence it will be hard for centralized deep learning models to transfer data. As a result there in near future Federated learning will be the state-of-art to method to train deep learning models. The companies who are not willing to shift their machine learning architectures will lose the race. We have built our solution using such a critical important method which will sustain itself.

Solution team work

First of all we studied what are the relevant problems we can identify under the given set of challenges to align with DigiEduHack Colombo - making learning efficient theme. We choosed student performance prediction challenge and started to refer papers related to the state-of-art tools and methods and refered their future works. Then we decided that we can improve and extend existing prediction models to achieve higher accuracies and predict more scenarios by using personal information. To use personal information to train models we decided to use the novelty method Federated Learning. All of the above tasks were divided among the members depending on thier interests and final decision was made after a thorough discussion among all the members.