



inzva Applied AI - 4. Hafta

Yapay Öğrenme Modellerinin Geliştirilme Süreci

Eğitim



TED Mersin Koleji (2012-2016)

İTÜ



İstanbul Teknik Üniversitesi (2017-...)



Projeler ve Çalışmalar



Recommender
Systems



Graph Neural
Networks and
Predictive Medicine



Predictive Modeling
and Explainable AI



Konular

- Eksik Veri ve Sınıf Dengesizliği
- Open Neural Network Exchange ile PyTorch'ta Geliştirilen Modeli Tensorflow'da Kullanmak
- Torchscript ile PyTorch Modellerini C++'ta Kullanmak
- MLFlow ile Deney Takibi

Eksik Veri ve Sınıf Dengesizliği



Eksik Veri Giderme Yöntemleri

- Tek Değişken Yöntemleri (Sütun Bazlı Veri Doldurma)
- Çoklu Değişken Yöntemleri (Diğer Sütunlar Dikkate Alınarak Veri Doldurma)



Eksik Veri Giderme

Tek Değişken

- Tek sütuna has istatistiksel bilgilerin veya sabit değerin kullanılması
 - Aritmetik Ortalama
 - Medyan
 - Mod
 - Sabit Değer

Çoklu Değişken

- Eksik veriler doldurulurken diğer sütunların da dikkate alınması.
 - En Yakın Komşu
 - Eksik Veri için Model Eğitmek



Sınıf Dengesizliğini Giderme

- Karar Sınırını Değiştirme
- Aşırı Örnekleme (Oversampling)
- Eksik Örnekleme (Undersampling)
- Hem Aşırı Hem Eksik Örnekleme
- Sentetik Veri Üretme
 - Generative Adversarial Networks
 - Normalizing Flows
 - Variational Autoencoders

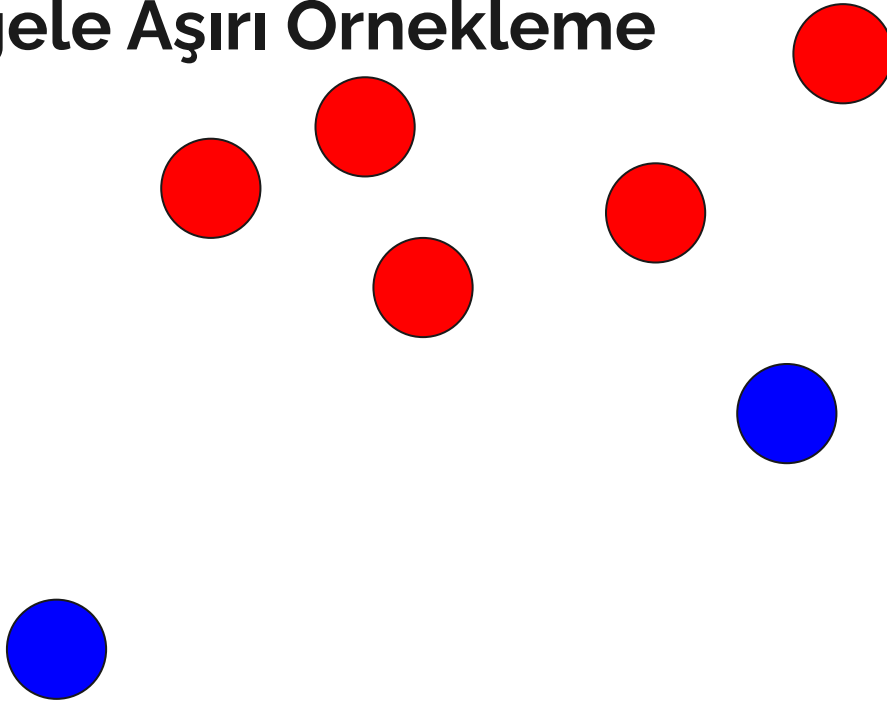


Aşırı Örneklemeye

- Rastgele Aşırı Örneklemeye
- SMOTE (Synthetic Minority Oversampling Technique)

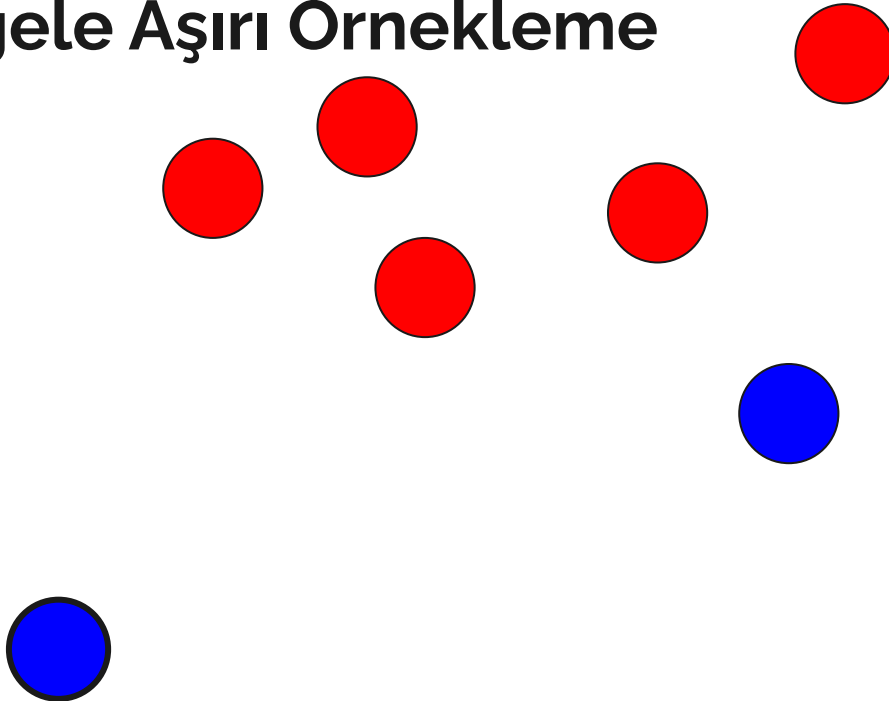


Rastgele Aşırı Örnekleme



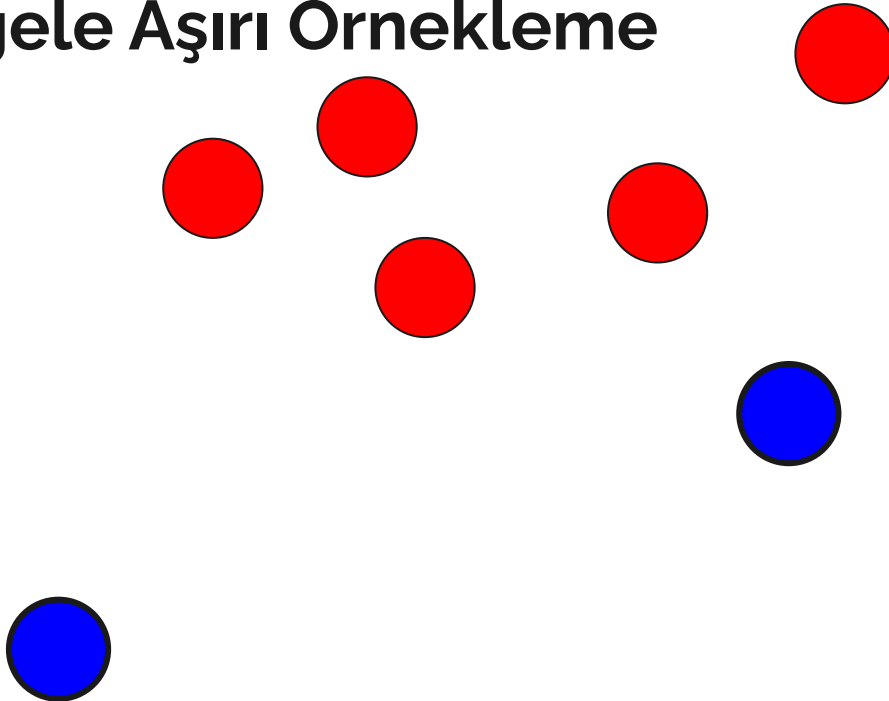


Rastgele Aşırı Örnekleme



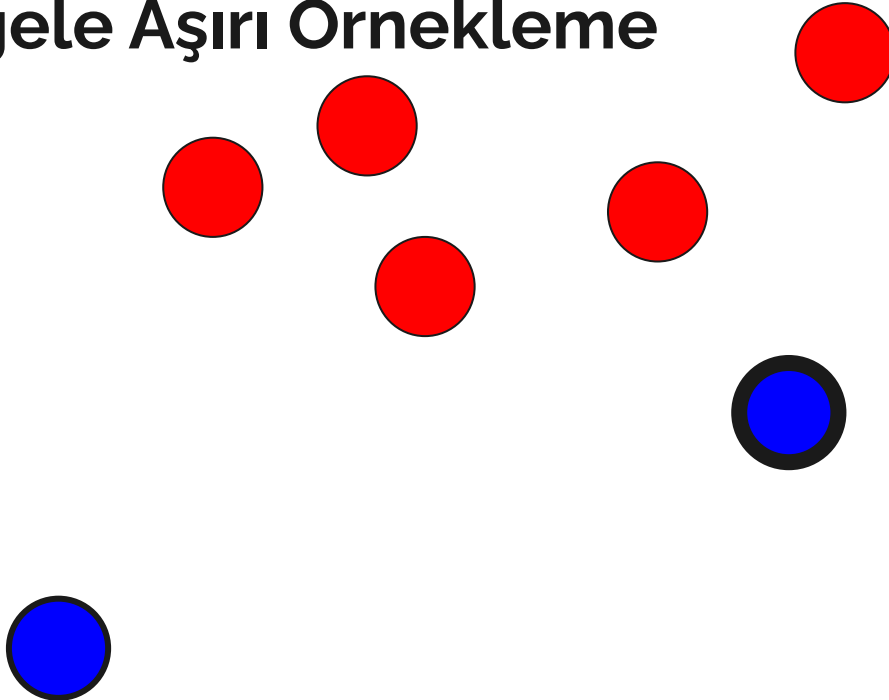


Rastgele Aşırı Örnekleme



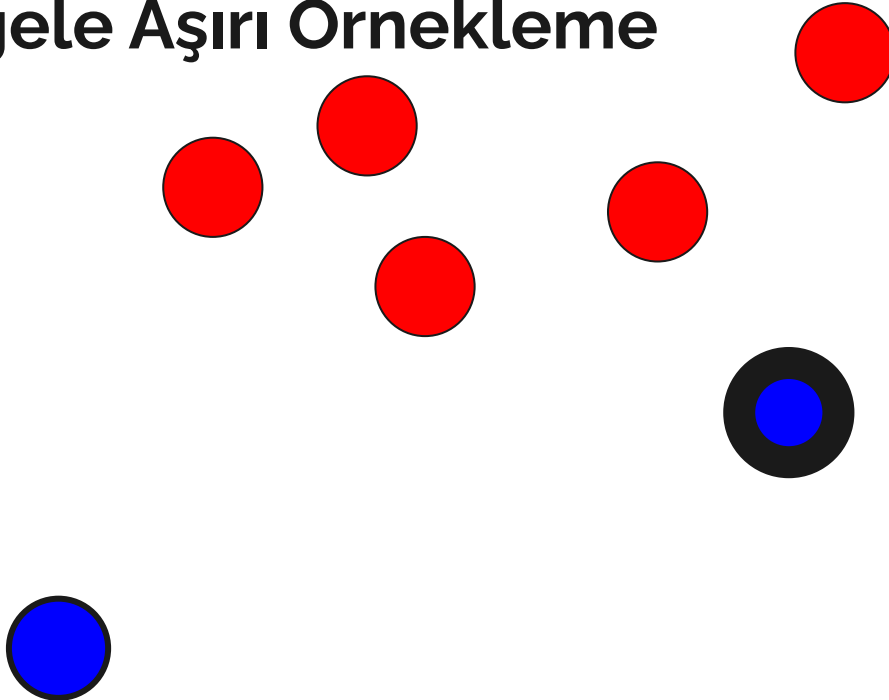


Rastgele Aşırı Örnekleme



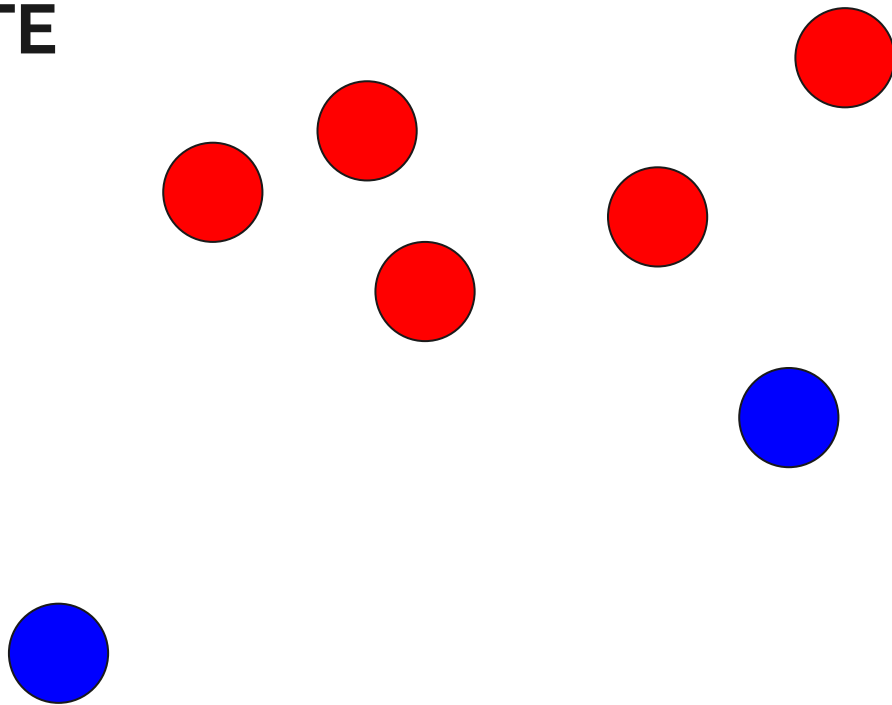


Rastgele Aşırı Örnekleme



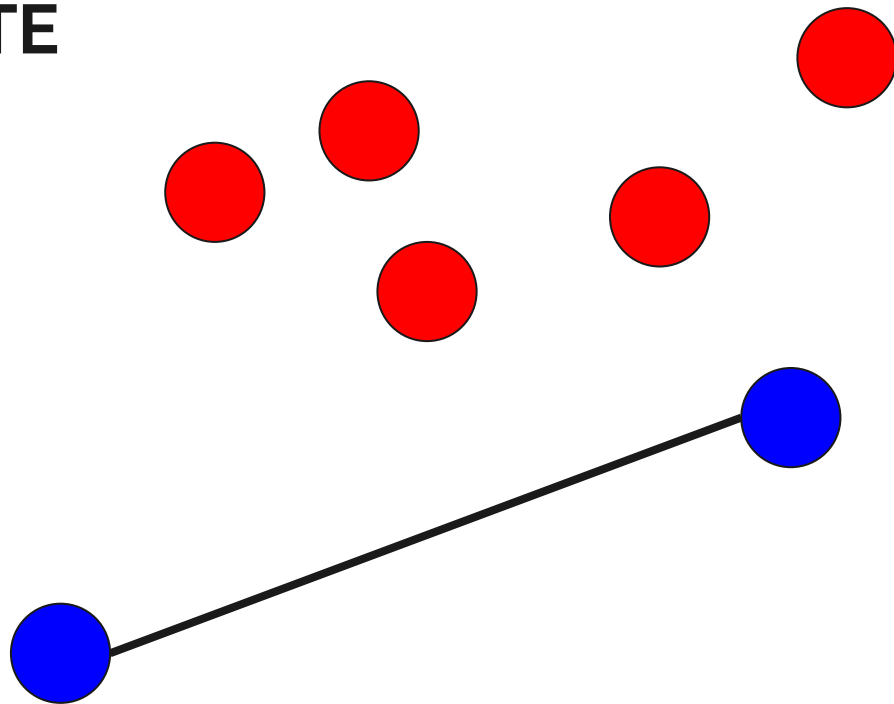


SMOTE



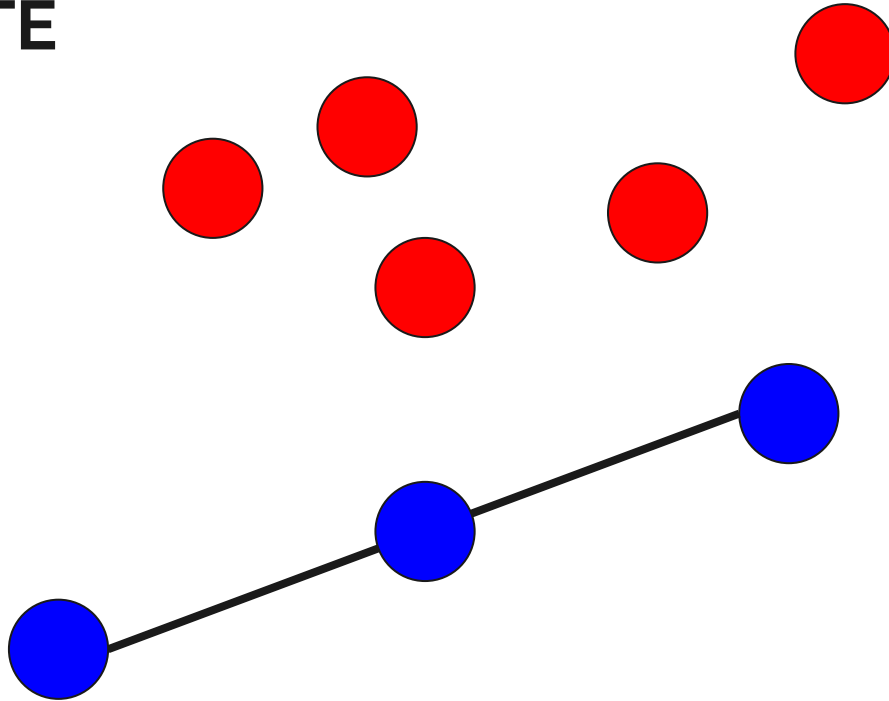


SMOTE



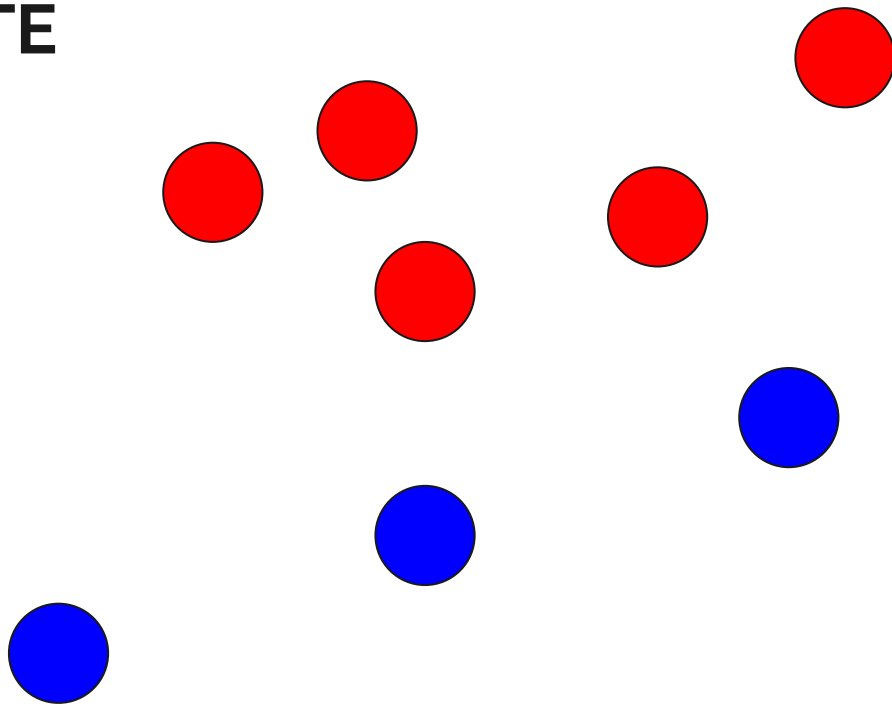


SMOTE



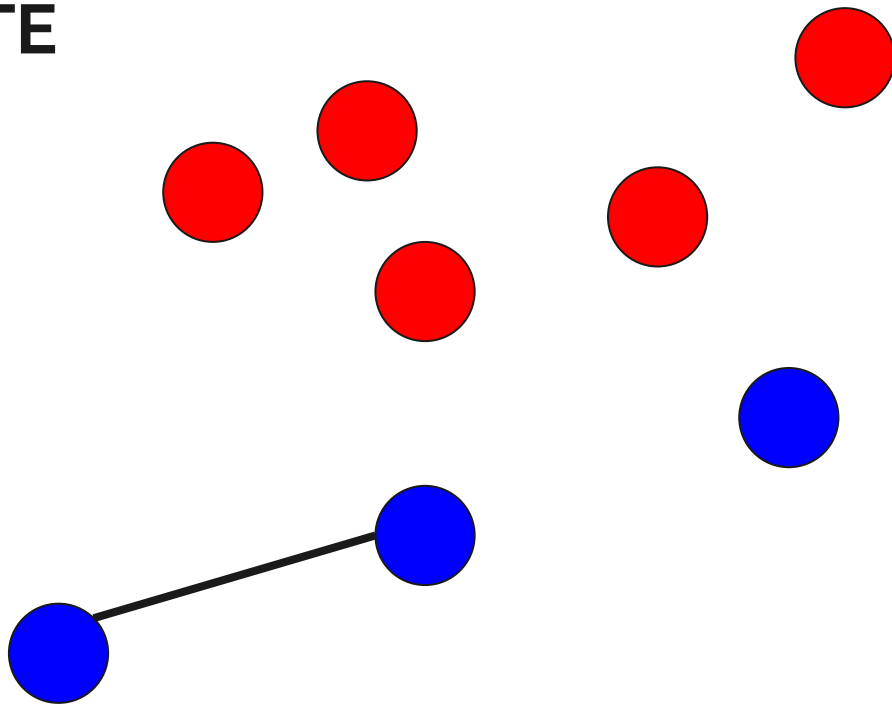


SMOTE



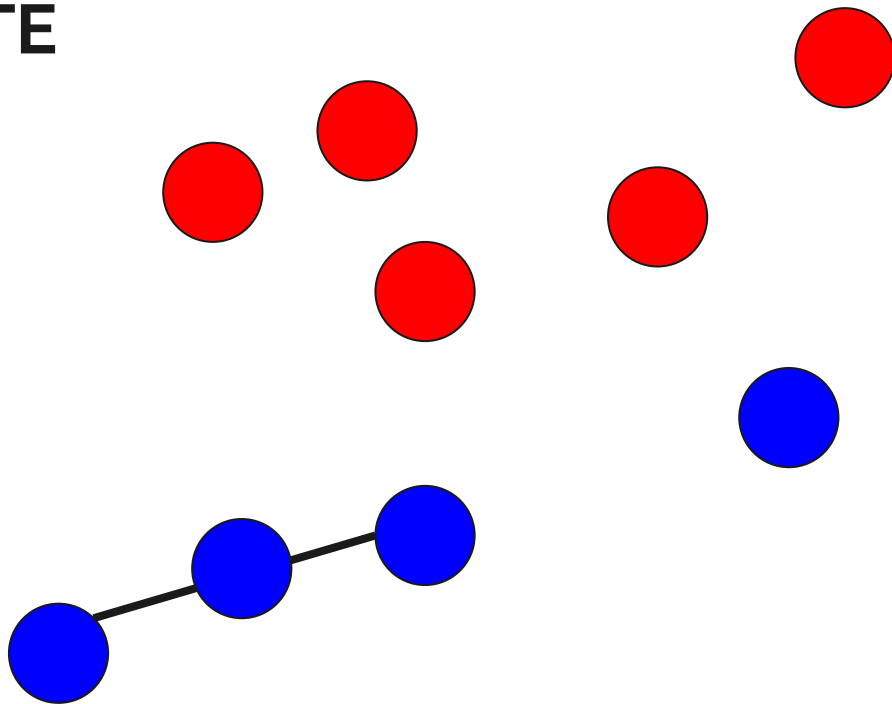


SMOTE



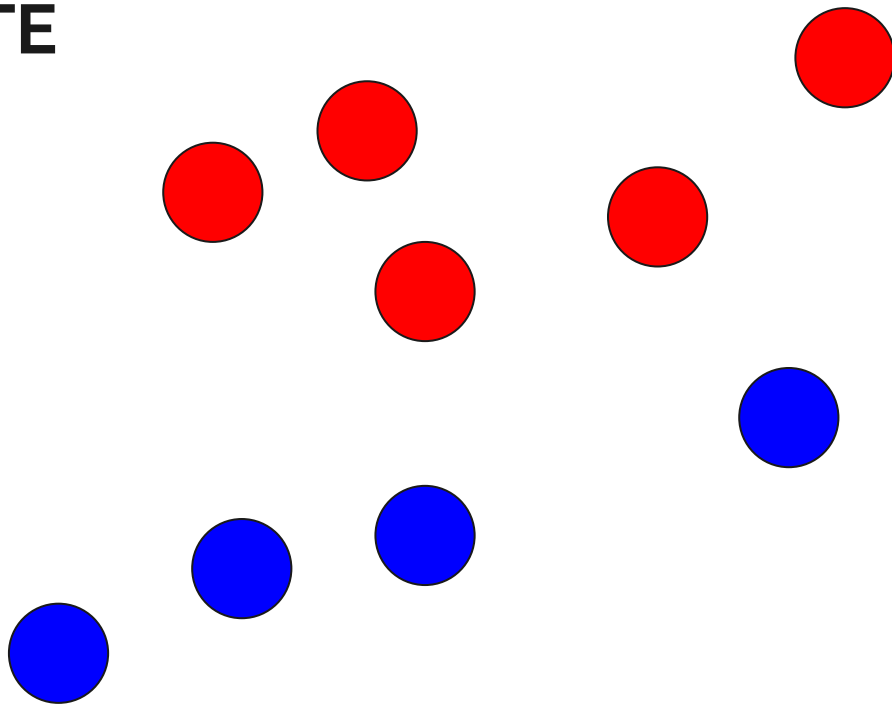


SMOTE



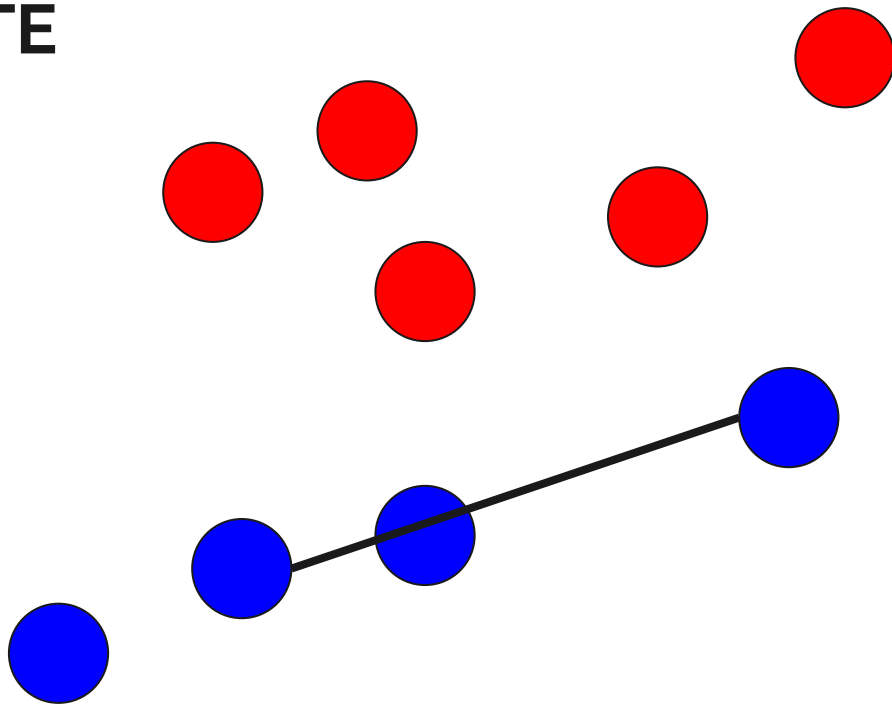


SMOTE



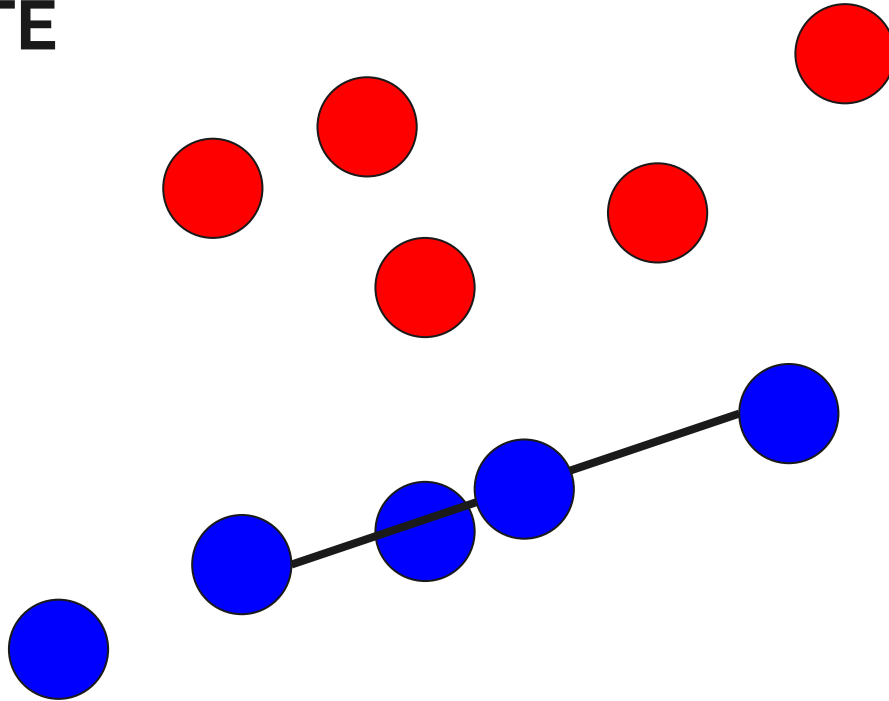


SMOTE



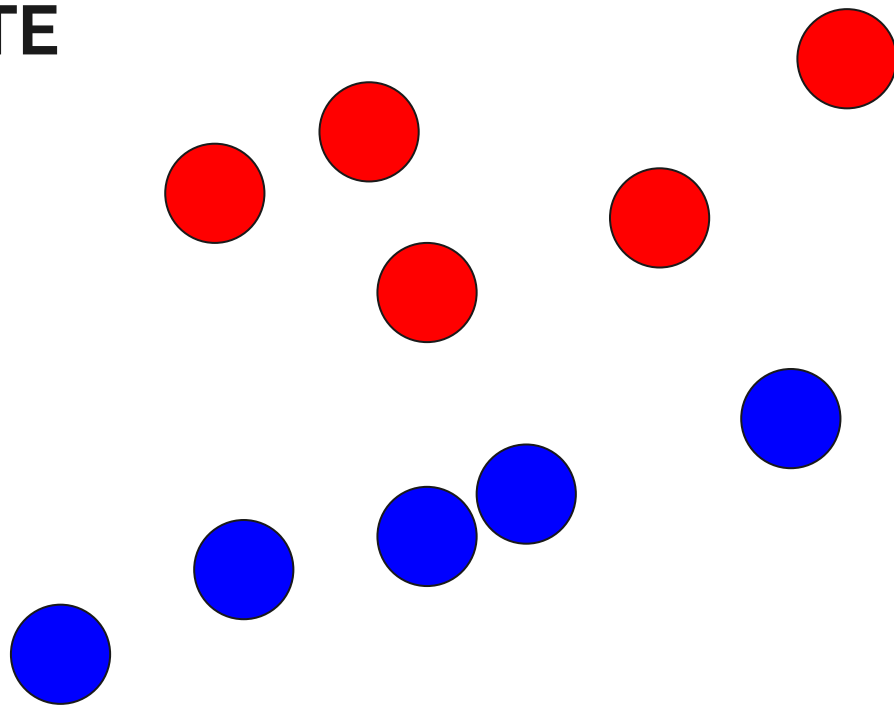


SMOTE





SMOTE



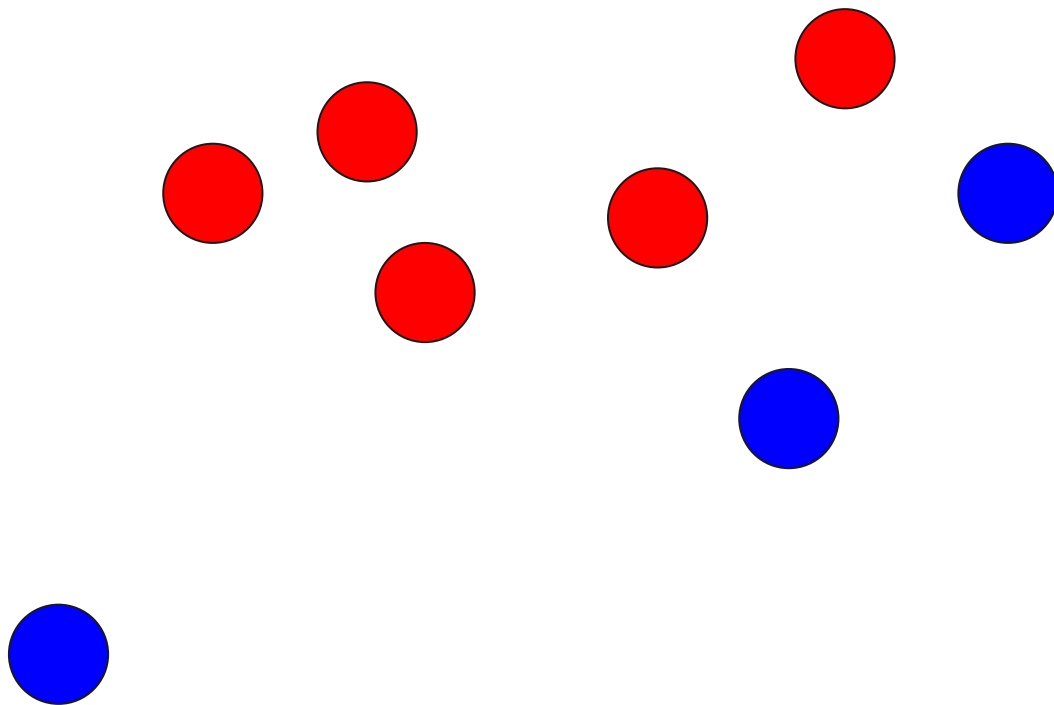


Eksik Örnekleme

- ENN (Edited Nearest Neighbor)
- Tomek-Links

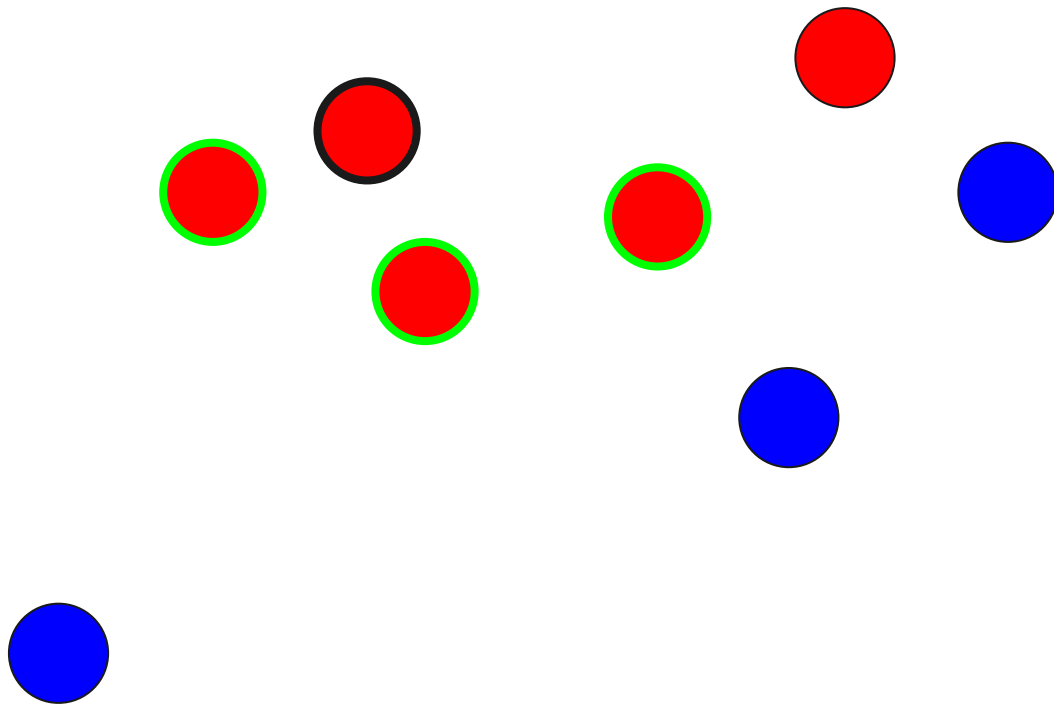


ENN



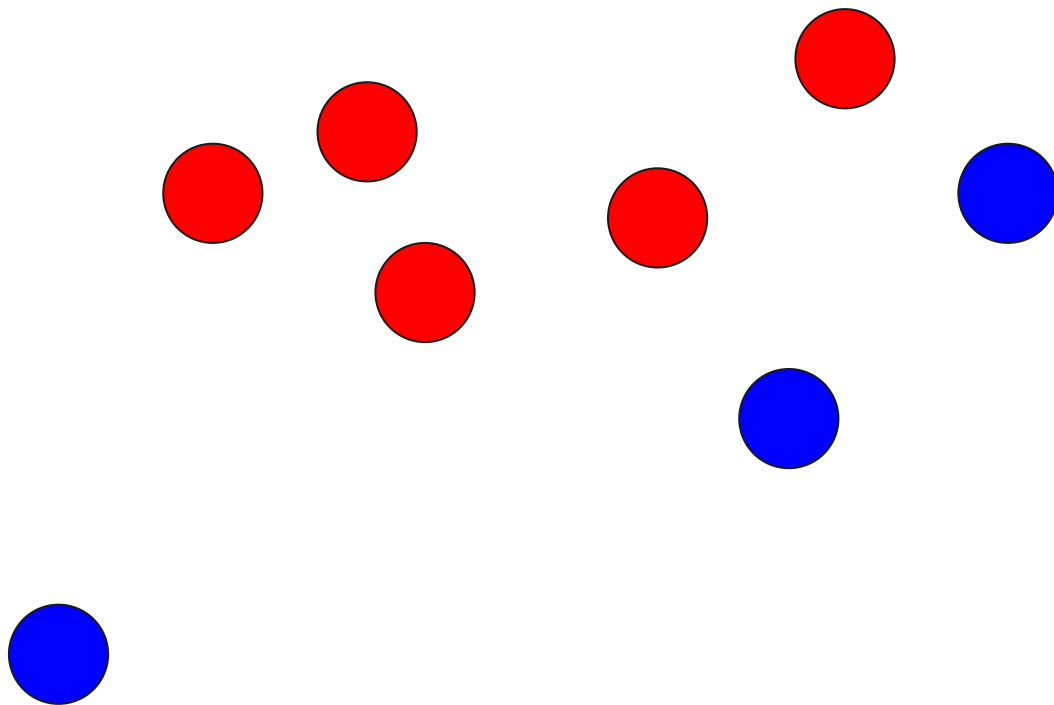


ENN



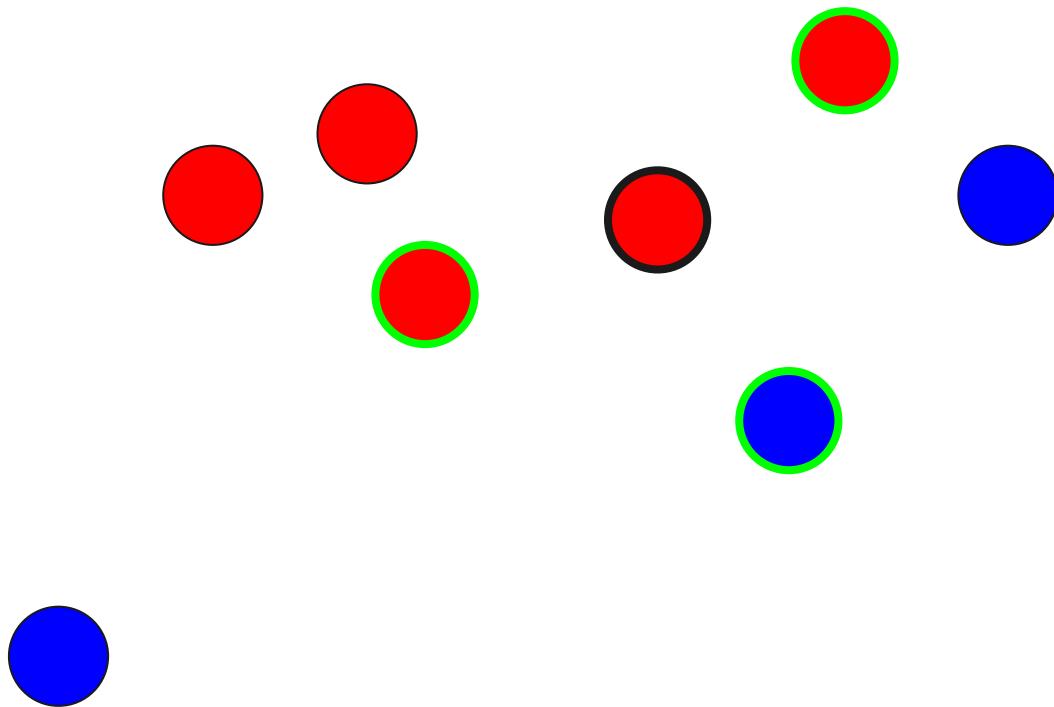


ENN



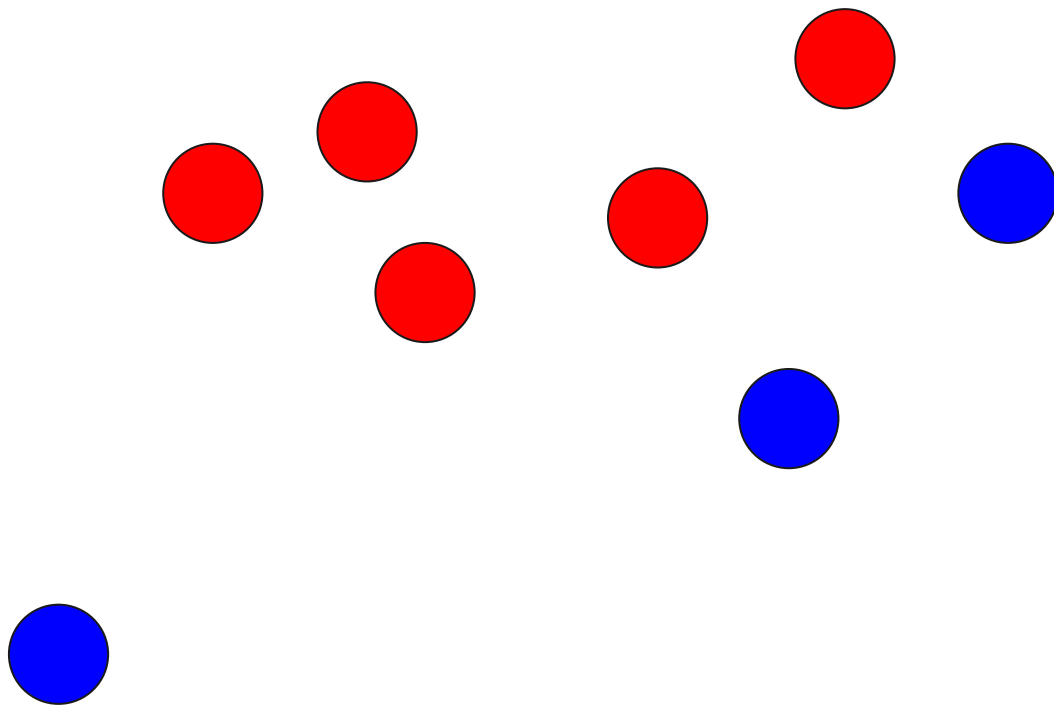


ENN



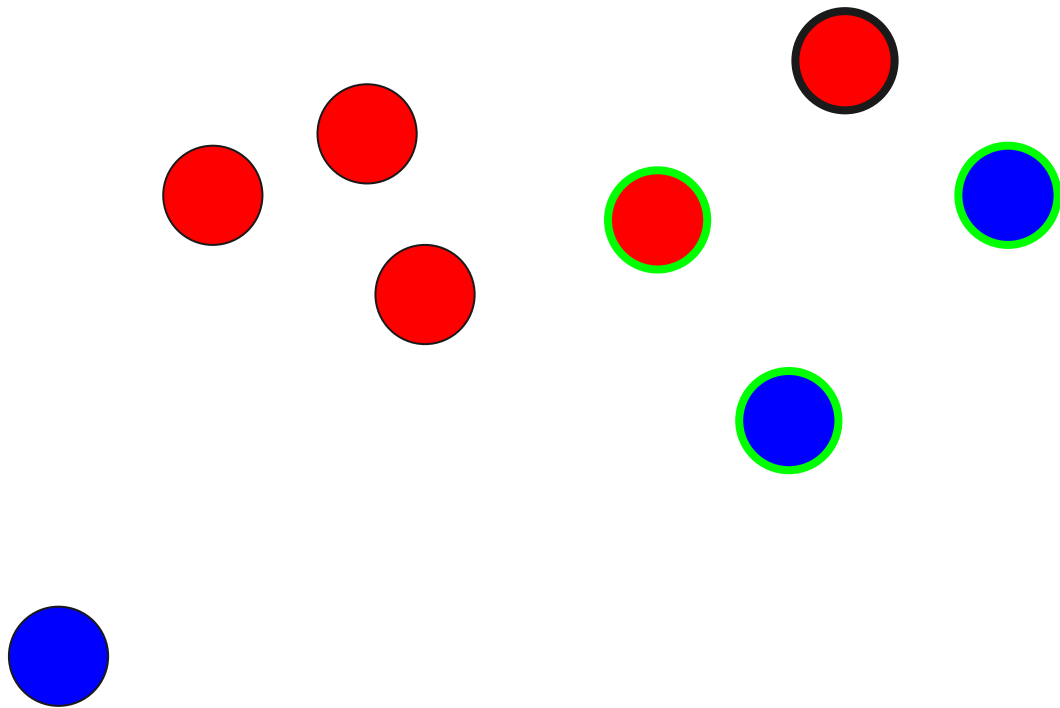


ENN



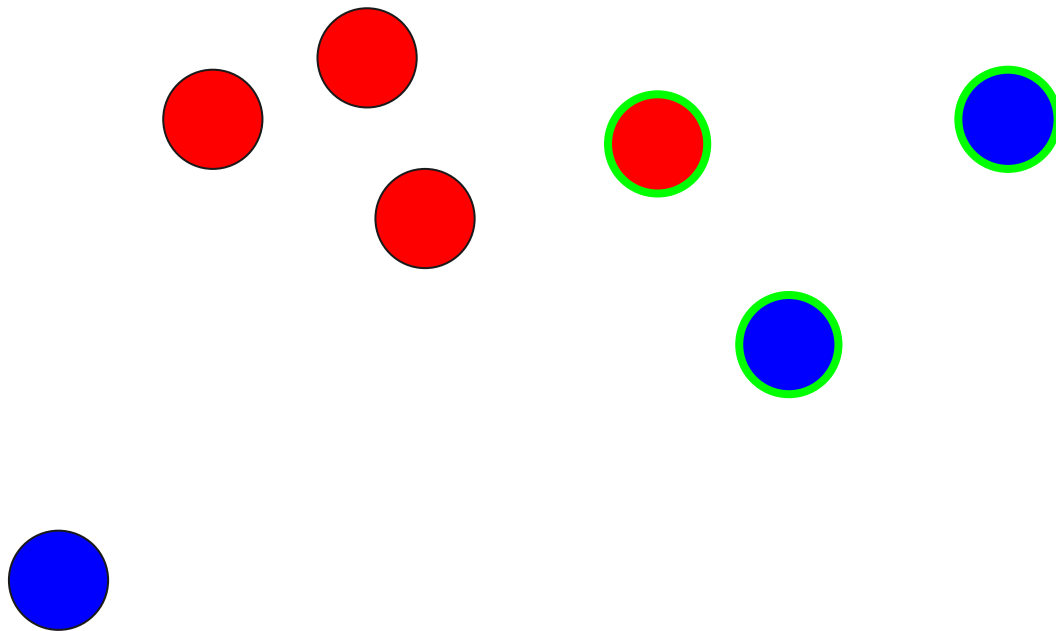


ENN



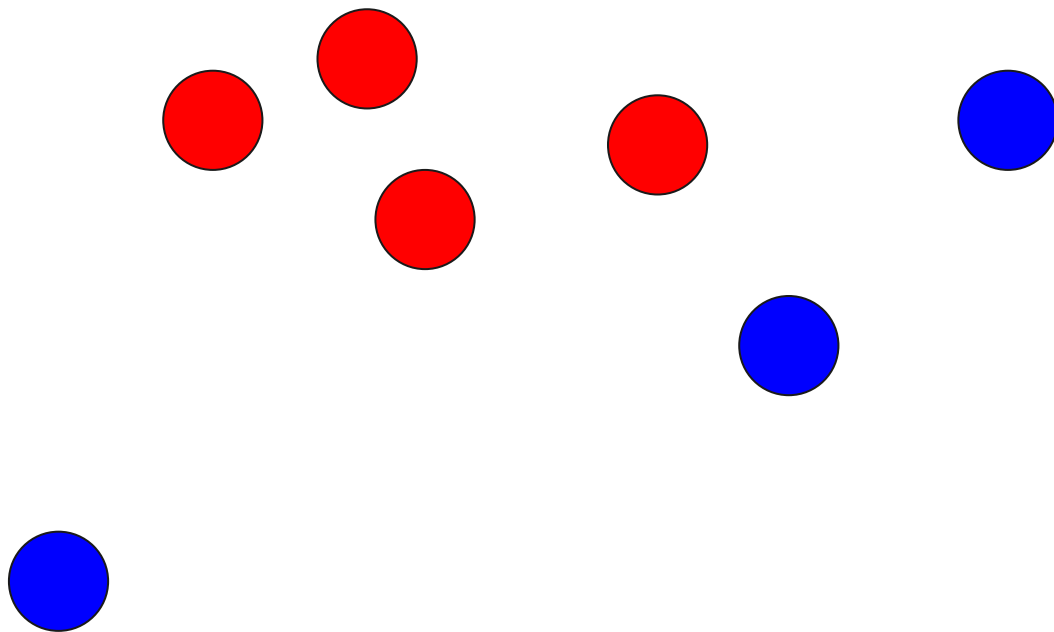


ENN



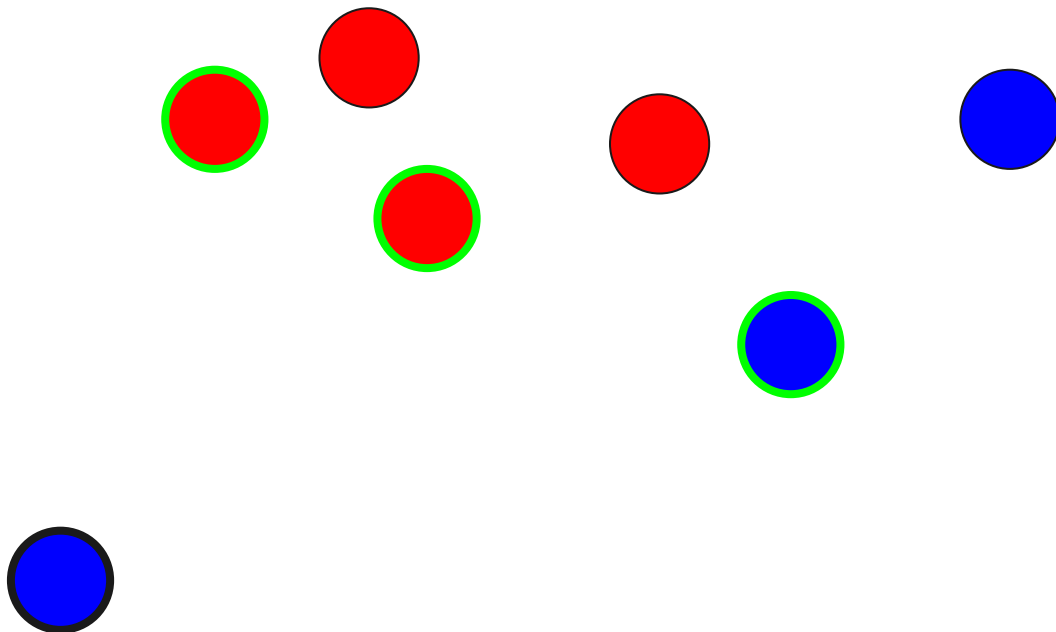


ENN



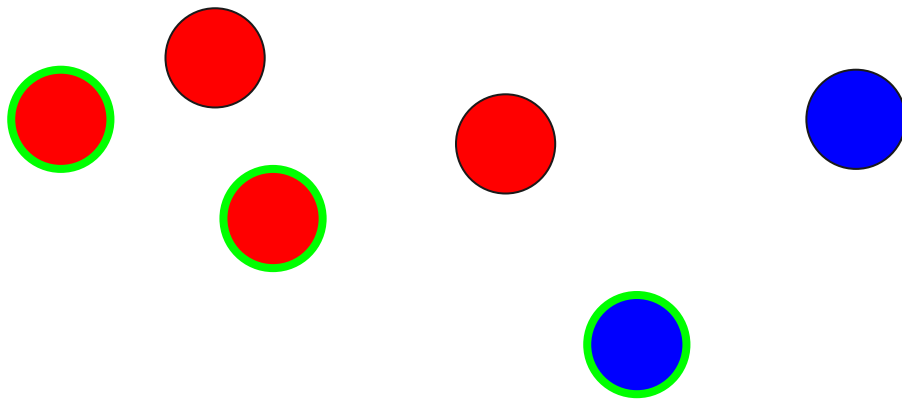


ENN



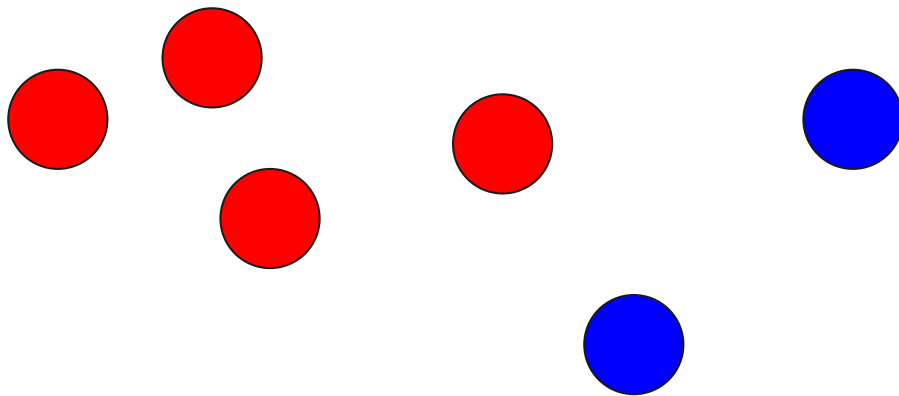


ENN



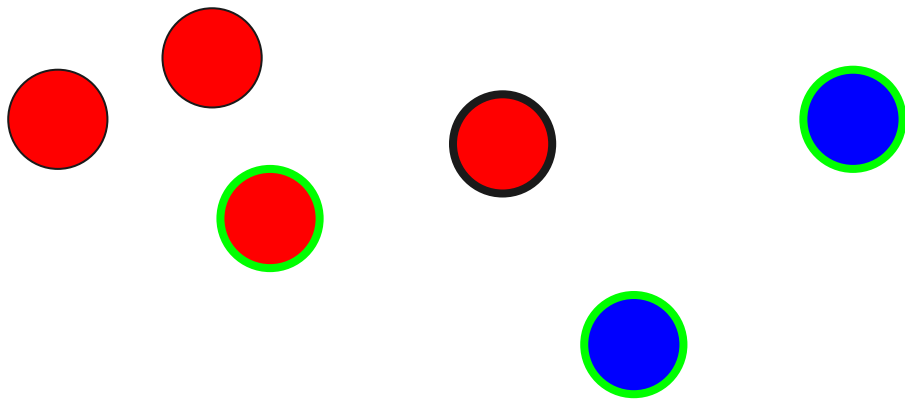


ENN



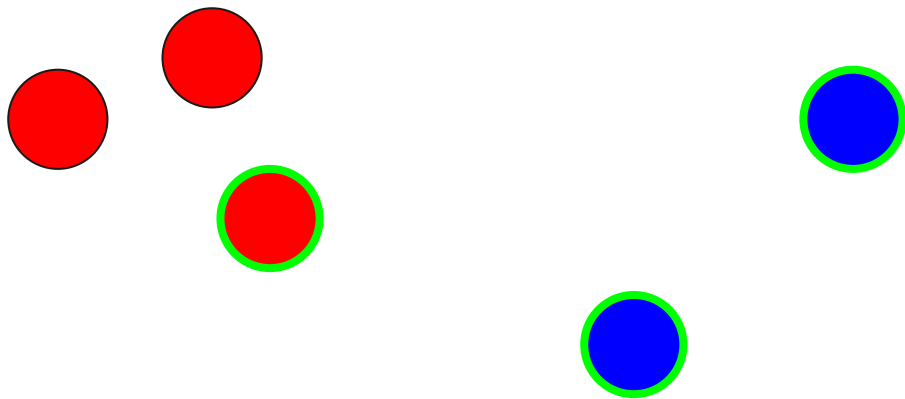


ENN



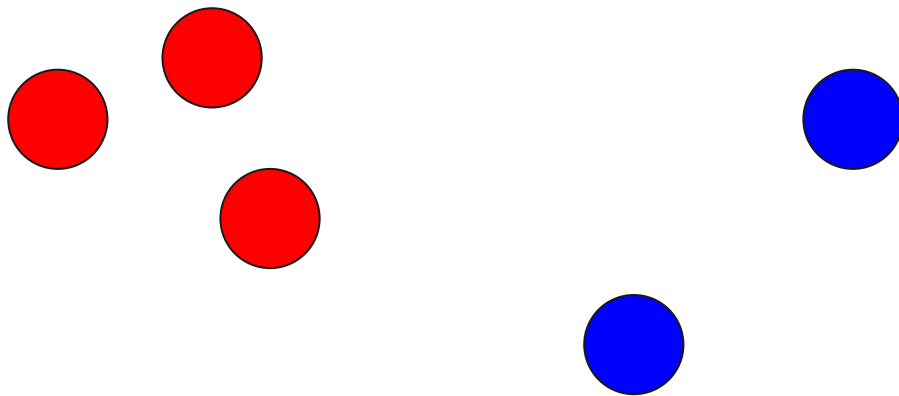


ENN



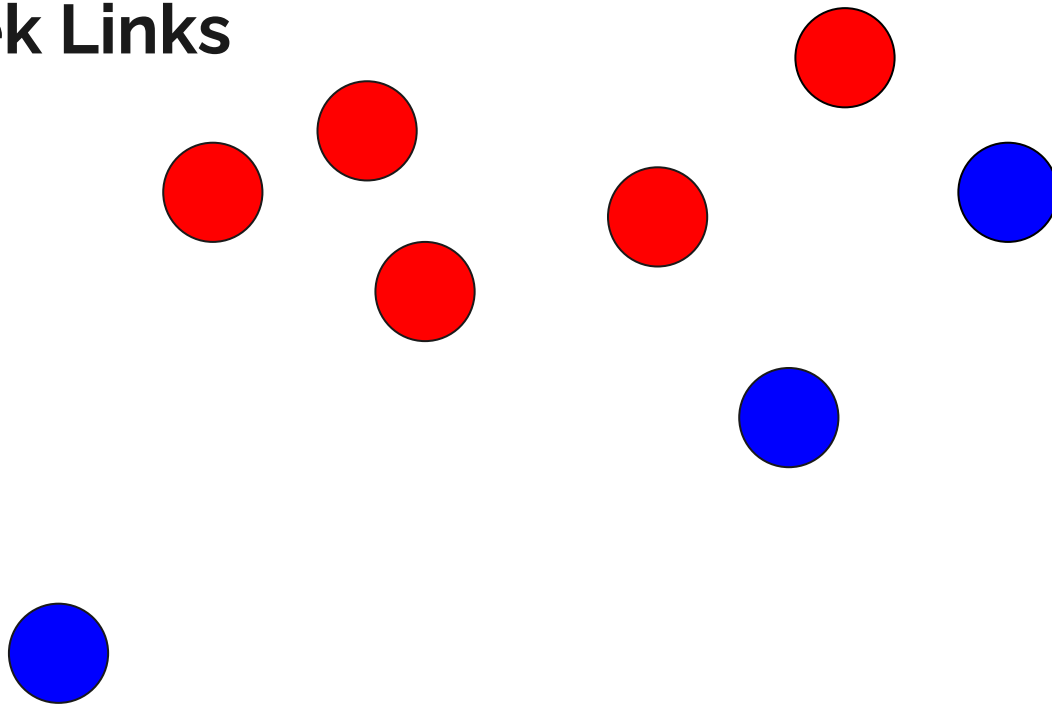


ENN



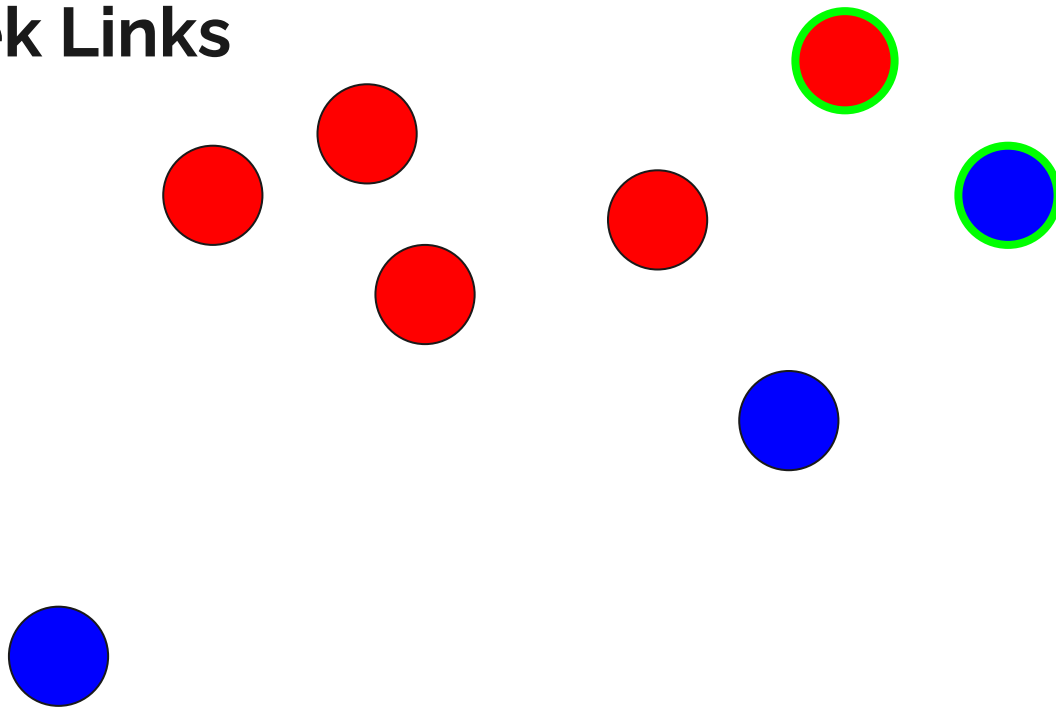


Tomek Links



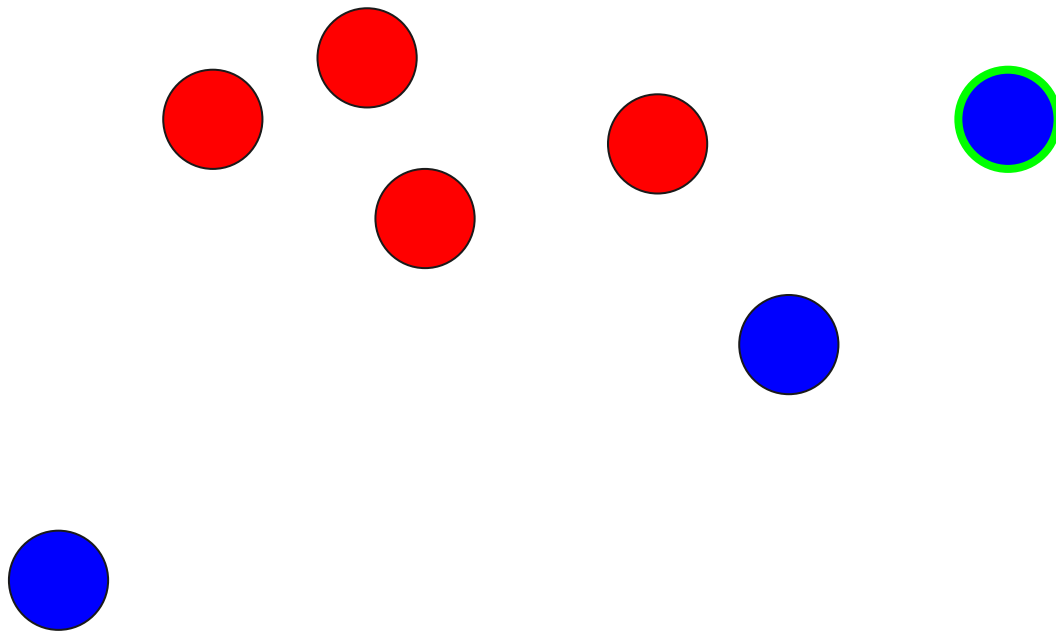


Tomek Links



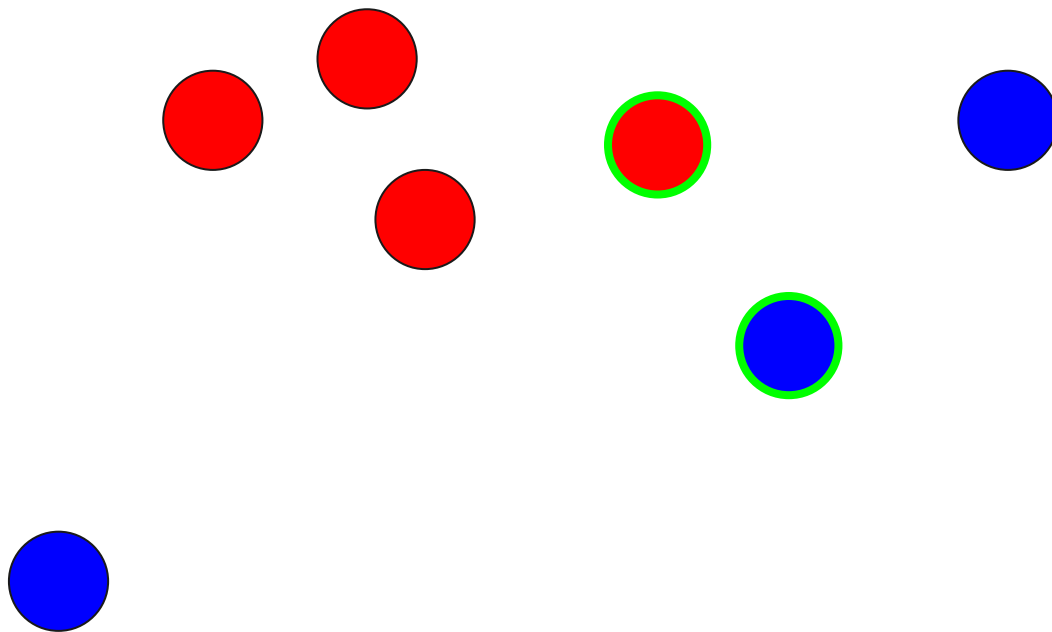


Tomek Links



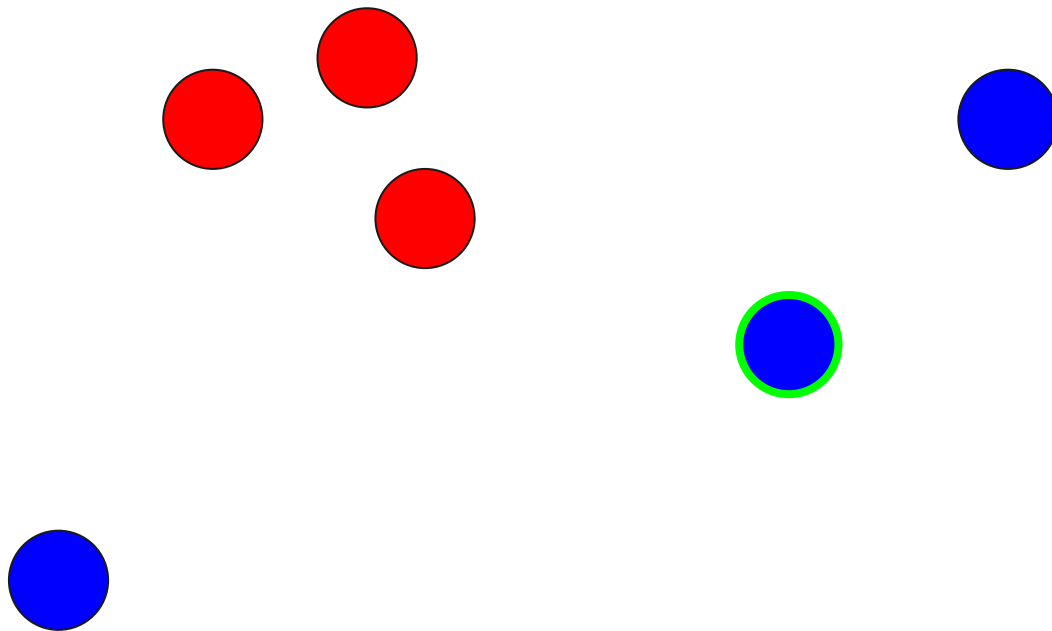


Tomek Links



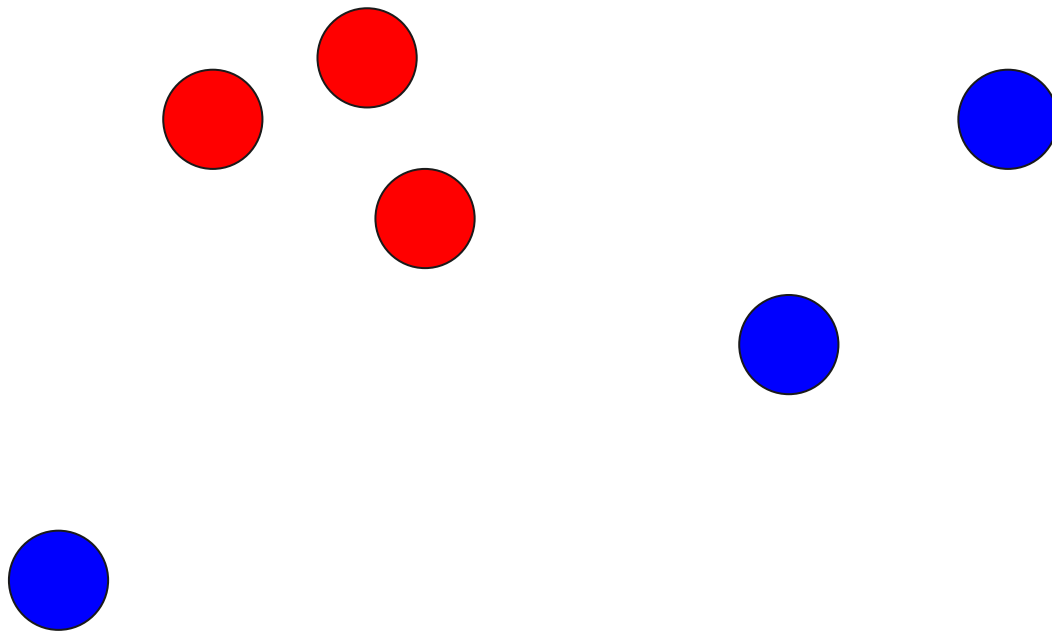


Tomek Links





Tomek Links



Notebook 1

Open Neural Network Exchange



ONNX

- <https://onnx.ai>
- <https://github.com/microsoft/onnxruntime>
- Interoperability: En sevdiğin kütüphaneyi kullanarak model yaz, istediğin dilde ve platformda kullan.
- Donanım ivmelendirmesinden yararlan.
- Yapay öğrenme geliştiricilerinin iletişim için kullanabileceği ortak bir format.
- Emekleme aşamasında.

Notebook 2

TorchScript



Torchscript

- Interoperability için PyTorch ekosisteminden bir alternatif.
- ONNX'e göre daha iyi destekleniyor.
- Emekleme aşamasında.

Notebook + Komut Satırı



Ön Hazırlık

Komut satırında:

- `wget https://download.pytorch.org/libtorch/nightly/cpu/libtorch-shared-with-deps-latest.zip`
- `unzip libtorch-shared-with-deps-latest.zip`



Program Derleme ve Çalıştırma

Komut satırında:

- Prepare CMakeLists.txt
- `nano -T 4 example-app.cpp`
- `cmake -DCMAKE_PREFIX_PATH=/home/ubuntu/projects/inzva/libtorch`
- `cmake --build . --config Release`



Daha Fazla Bilgi

- TorchScript: <https://pytorch.org/docs/master/jit.html>
- PyTorch C++ API: <https://pytorch.org/cppdocs/>

MLFlow ile Deney Takibi

Komut Satırı



Ön Hazırlık

Komut satırında:

- `pip install mlflow`