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ARTIFICIAL NEURAL NETWORKS IN SPORT SCIENCE

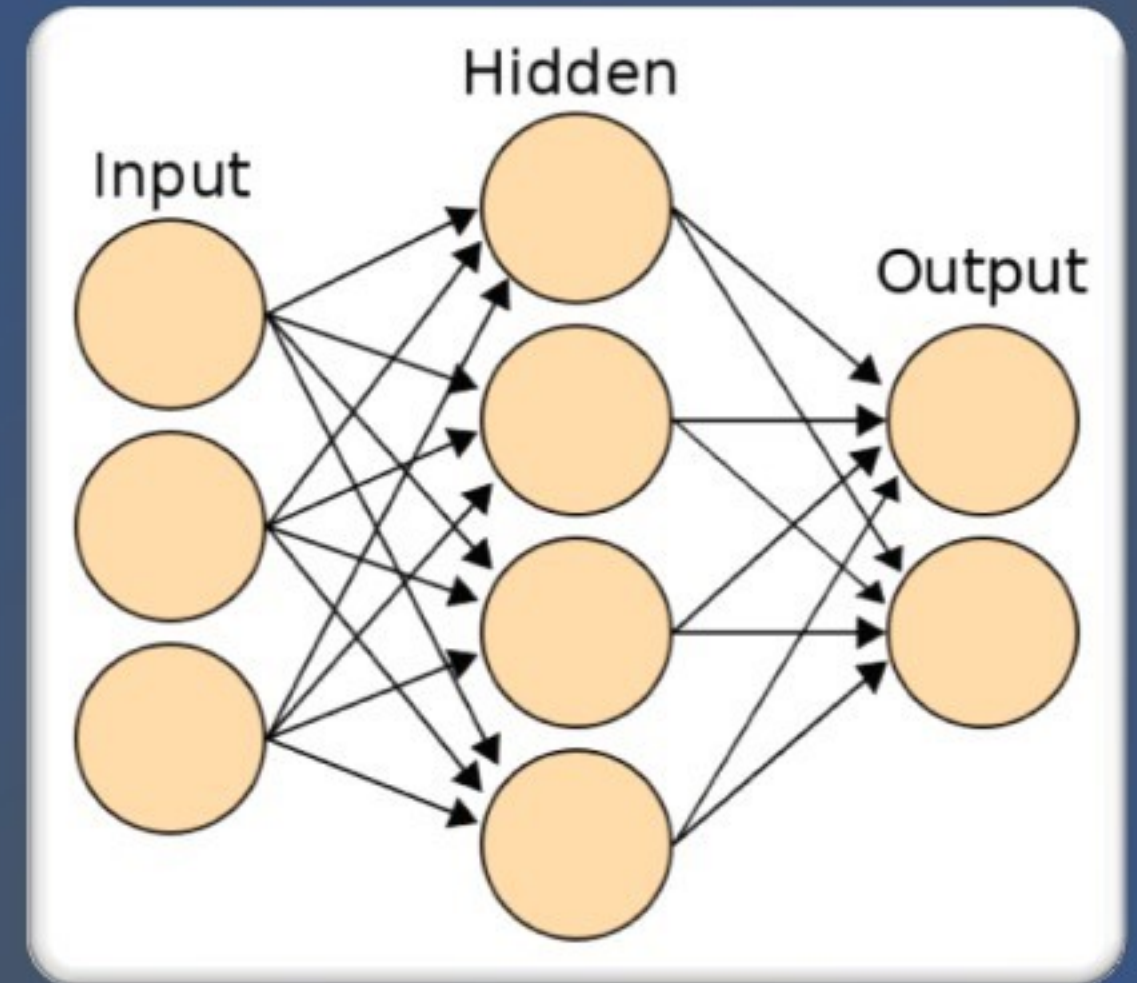
Kopaonik, 2020.

ABOUT ARTIFICIAL NEURAL NETWORKS

- Artificial neural networks (ANNs) are computing systems inspired by the biological neural networks.
- There are two basic types of ANNs – static and dynamic.
- They are able to “learn” to perform tasks.
 - The learning or training process can be either supervised or unsupervised.
- ANNs capabilities fall within the following broad categories:
 - Classification,
 - Clustering,
 - Prediction.

ABOUT ARTIFICIAL NEURAL NETWORKS

- ANNs are consisted of layers:
 - input layer,
 - one or multiple hidden layers,
 - output layer.
- Layers are consisted of cells.
- The cells are connected by links.



ANNs IN SPORT

Tactical analysis

- Handball Women's Junior World Championship 2001: offensive pattern analysis.

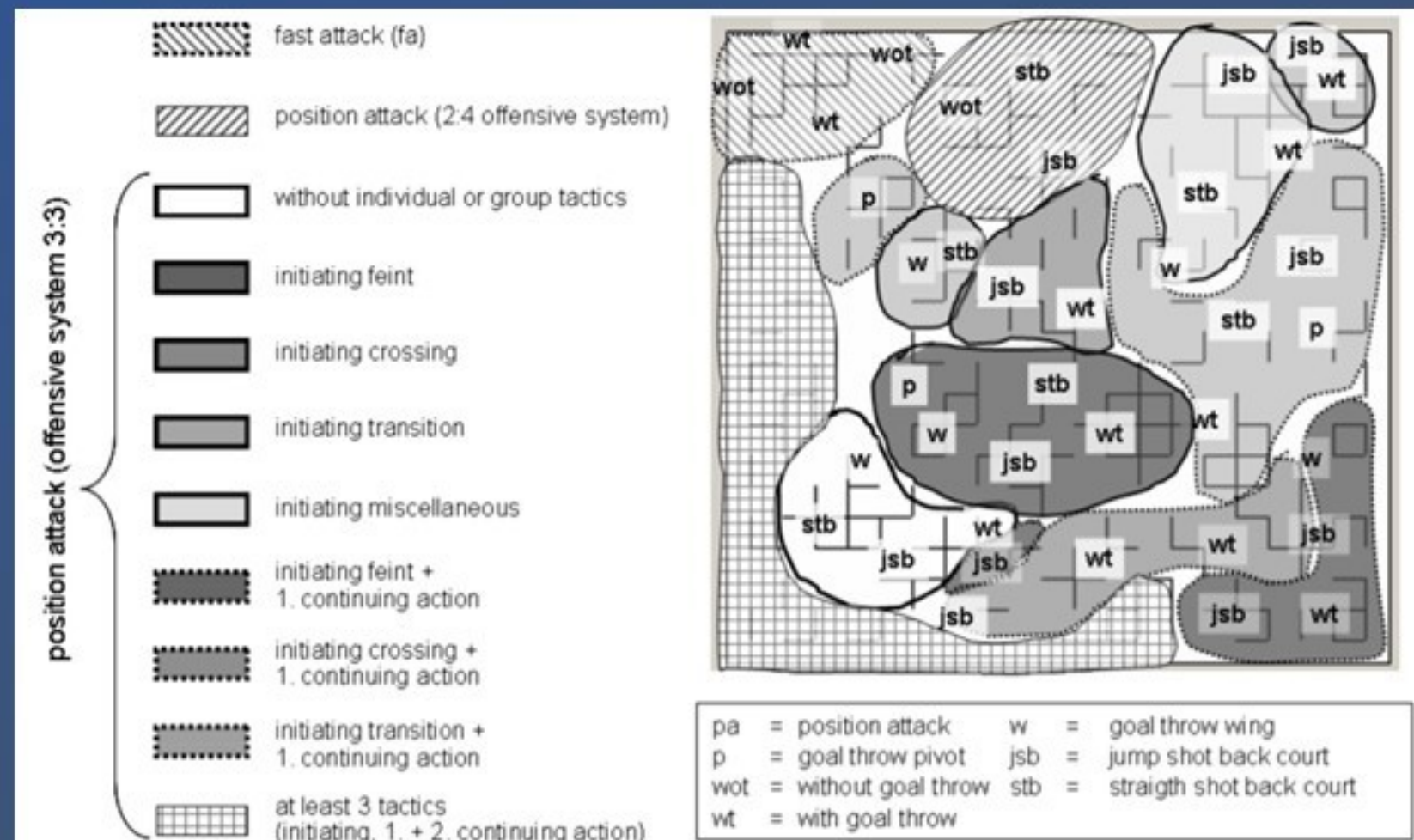


Figure 3. Type-pattern of the offensive attempts (Women's Junior World Championship 2001)

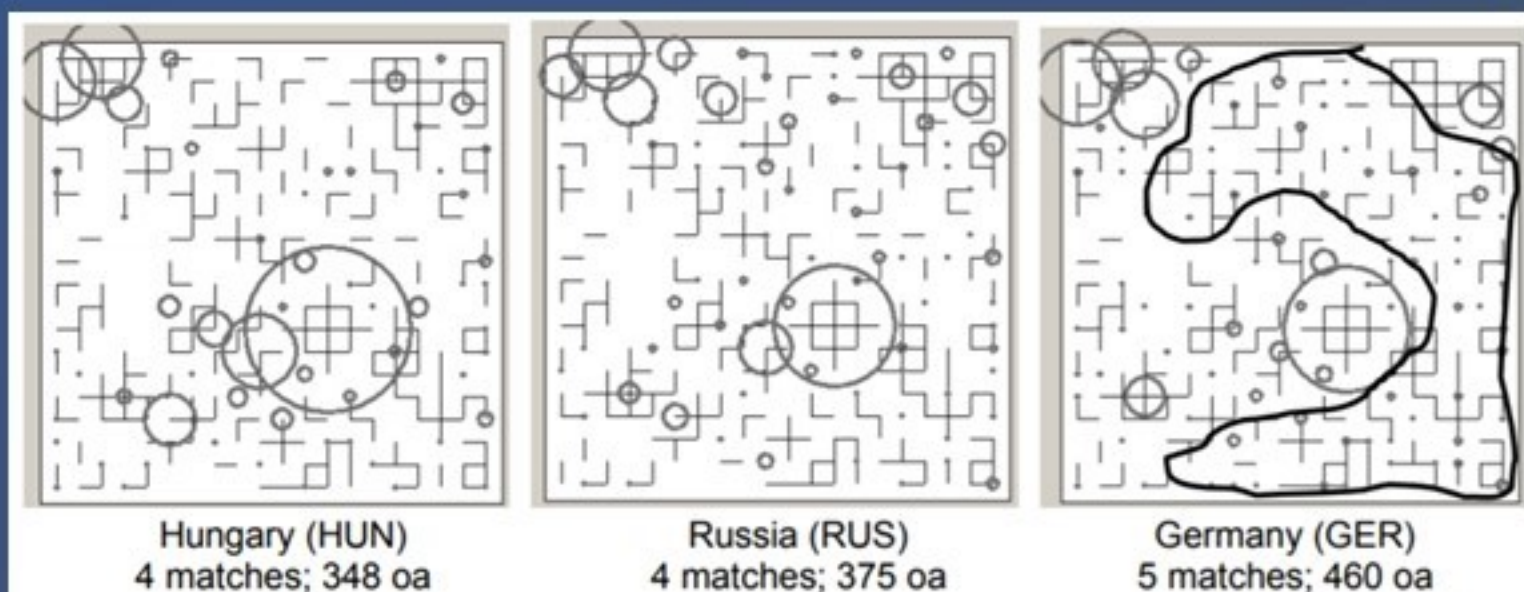


Figure 4. Type-pattern of offensive attempts (oa) of the best three teams (placement 1.- 3.)

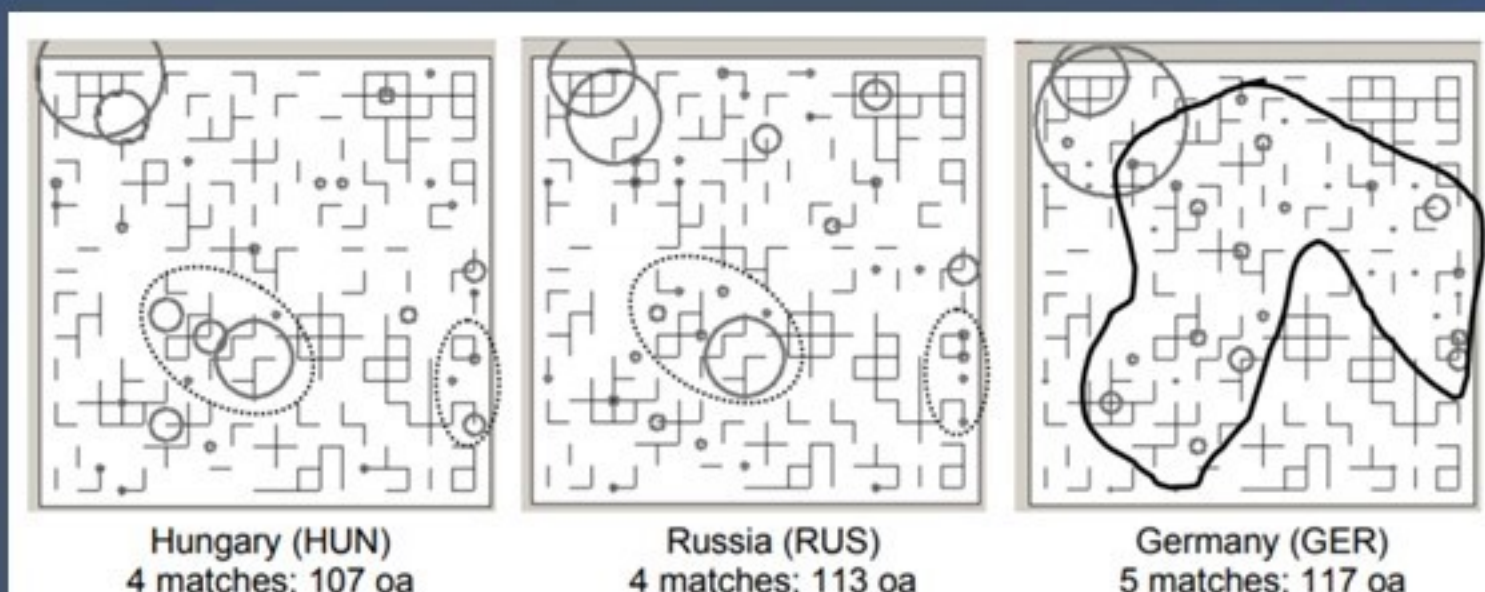
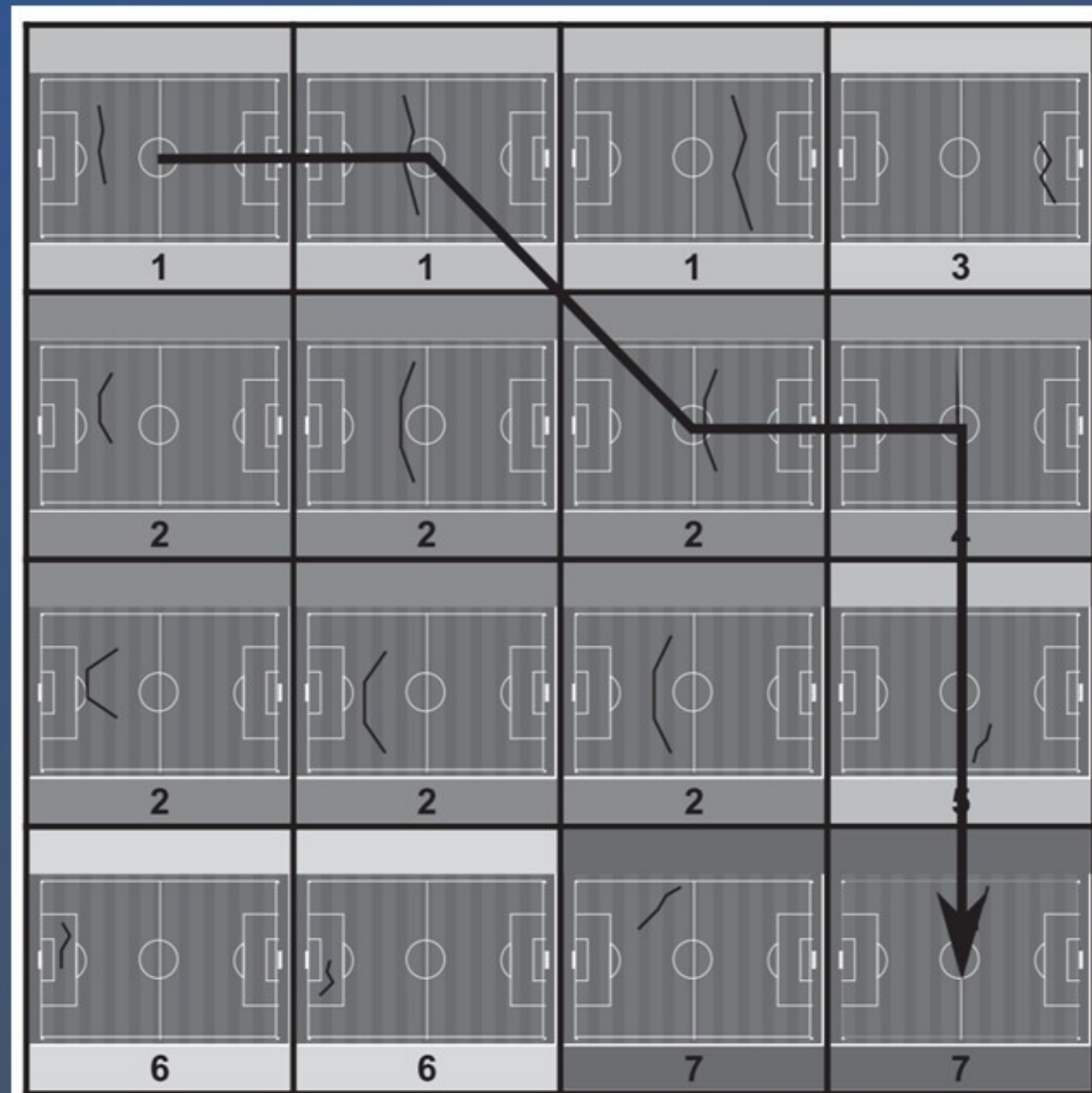


Figure 5. Type-pattern of successful offensive attempts (oa) of the best three teams

ANNs IN SPORT

Tactical analysis

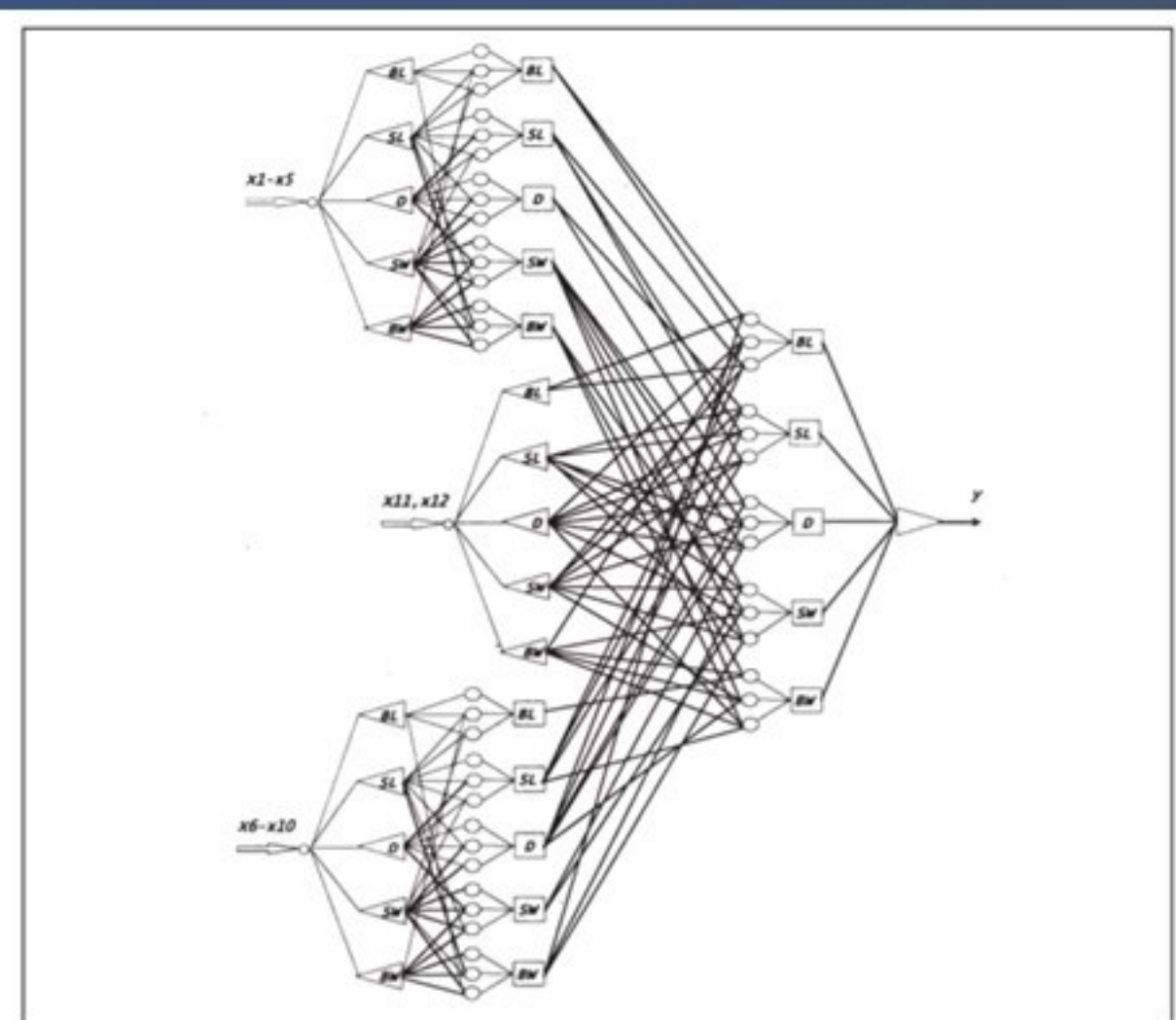
- FIFA World Cup 2006
Final: Defense analysis.



ANNs IN SPORT

Prediction

- ANNs see their use in sport results prediction.
- They were used to successfully predict team sports results based on previous team matches.
- ANNs were used to predict the winners in horseracing.



Neural fuzzy prediction network.

ANNs IN SPORT

Analysis

- Due to the amount of data generated in modern sports, ANNs are continuously seeing increased use when analysing big data sets – slowly replacing the usual mathematical and statistical methods.
- ANNs flexibility and robustness allow them to handle big data and offer never before seen levels of insight when analysing individual or team sports.



Thank you for your attention!