

BÖLÜM 4

MAKİNE ÖĞRENMESİ TABANLI ADI FİĞ (VİCİA SATİVA) TOHUMLARININ FİZİKSEL ÖZELLİKLERİNİN TAHMİNİ VE SINIFLANDIRILMASI

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1. GİRİŞ

Adı fiğ (*Vicia sativa L.*) *fabaceae* familyasına ait ekonomik açıdan önemi olan tek yıllık yem bitkisidir (Miki ve ark., 2009). Orta Anadolu topraklarında doğal yayılış gösteren fiğ (Ford ve ark., 2008), günümüzde zengin protein ve mineral içeriğinden dolayı birçok ülkede yaygın olarak yetişiriciliği yapılmaktadır (Akpinar ve ark., 2001; Mao ve ark., 2015). Ülkemizde de en fazla yetiştirlen yem bitkilerinden biri olan adı fiğ kıyı bölgelerimizde kuru ot, iç bölgelerimizde ise tane amaçlı tarımı yapılmaktadır (Açık-göz, 2011). Hayvan beslenmesinde otlatma amacıyla, silaj yapımında, kuru ot ve tane üretimi için kullanılırken (Abbeddou ve ark., 2011; Larbi ve ark., 2011) bıraktığı kök ve artıkları sayesinde toprağın organik madde oranını artırdığı saptanmıştır (Çaçan ve ark., 2018). Aynı zamanda buğdayıllar yem bitkileri ile kıyaslanlığında temel besin maddeleri bakımından daha zengin olduğu ve fiğ ile beslenen hayvanların süt verimlerinde artışlar olduğu

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KAYNAKLAR

- Abbeddou, S., Rihawi, S., Hess, H.D., Iniguez, L., Mayer, A.C., Kreuzer, M., 2011. Nutritional composition of lentil straw, vetch hay, olive leaves, and saltbush leaves and their digestibility as measured in fat-tailed sheep. *Small Ruminant Research*, 96: 126–135.
- Açıkgoz, E., 2011. Yem Bitkileri Yetiştiriciliği. Süt Hayvancılığı, Eğitim Merkezi Yayınları Hayvancılık Serisi. Türkiye.
- Akpınar, N., Akpinar, M.A., Turkoglu, S., 2001. Total lipid content and fatty acid composition of the seeds of some *Vicia* L. species. *Food Chemistry*, 74: 449–453.
- Altuntas, E., Karadag, Y., 2006. Some physical and mechanical properties of sainfoin (*Onobrychis sativa* Lam.), grasspea (*Lathyrus sativus* L.) and bitter vetch (*Vicia ervilia* (L.) Willd.) seeds. *Journal of Applied Sciences*, 6: 1373–1379.
- Berhane, T., Lane, C., Wu, Q., Autrey, B., Anenkhonov, O., Chepinoga, V., Liu, H., 2018. Decision-tree, rule-based, and random forest classification of high-resolution multispectral imagery for wetland mapping and inventory. *Remote Sensing*, 10: 580.
- Bradley, A.P., 1997. The use of the area under the ROC curve in the evaluation of machine learning algorithms. *Pattern Recognition*, 30(7): 1145–1159.
- Breiman, L., 2001. Random Forests. *Machine Learning*, 45(1): 5–32.
- Concha-Meyer, A., Eifert, J., Wang, H., Sanglay, G., 2018. Volume estimation of strawberries, mushrooms, and tomatoes with a machine vision system. *International Journal of Food Properties*, 21(1): 1867–1874.
- Costa, C., Antonucci, F., Pallottino, F., Aguzzi, J., Sun, D.W., Menesatti, P., 2011. Shape analysis of agricultural products: a review of recent research advances and potential application to computer vision. *Food and Bioprocess Technology*, 4: 673–692.
- Çaçan, E., Kökten, K., Kaplan, M., Yılmaz, Ş.H., 2018. Bazı Adı Fiğ hat ve çeşitlerinin (*Vicia sativa* L.) ot verimi ve ot kalitesi açısından değerlendirilmesi. *Harran Tarım ve Gıda Bilimleri Dergisi*, 22(1): 47–61.
- Çetin, N., Sağlam, C., 2022. Rapid detection of total phenolics, antioxidant activity and ascorbic acid of dried apples by chemometric algorithms. *Food Bioscience*, 47: 101670.
- Çetin, N., Karaman, K., Beyzi, E., Sağlam, C., Demirel, B., 2021. Comparative evaluation of some quality characteristics of sunflower oilseeds (*Helianthus annuus* L.) through machine learning classifiers. *Food Analytical Methods*, 14: 1666–1681.
- Çetin, N., 2022. Machine learning for varietal binary classification of soybean (*Glycine max* (L.) Merrill) seeds based on shape and size attributes. *Food Analytical Methods*, 15: 2260–2273.
- Dumanoğlu, Z., Çaçan, E., Kökten, K., 2022. Yayın fiğ (*Vicia sativa* L.) tohumlarına ait bazı morfolojik ve fizyolojik özelliklerinin belirlenmesi üzerine bir

- araştırma. MAS Journal of Applied Sciences, 7(1): 41-47.
- Ford, R., Maddeppungeng, A.M., Taylor, P.W.J., 2008. Vetch. In: C. Kole, T. C. Hall (eds), Compendium of transgenic crop plants: Transgenic legume seeds and forages, Vol 9. Blackwell Publishing, Oxford, pp. 163–170.
- Hall, M., Frank, E., Holmes, G., Pfahringer, B., Reutemann, P., Witten, I.H., 2009. The WEKA data mining software: an update. SIGKDD Explorations.
- İşik, E., İzli, N., 2016. Effects of moisture content on some physical properties of the yellow lentil. Journal of Agricultural Sciences, 22(2): 307-316.
- Karray, F., Karray, F.O., De Silva, C.W., 2004. "Soft Computing and Intelligent Systems Design: Theory, Tools, and Applications". Pearson Education.
- Khazaei, J., Jafari, S., Noorolah, S., 2008. Lognormal vs. Normal and Weibull distributions for modeling the mass and size distributions of sunflower seeds and kernels. World Conference on Agricultural Information and IT.
- Kibar, H., Özтурk, T., Temizel, K.E., 2014. Effective engineering properties in the design of storage structures of postharvest dry bean grain. Acta Scientiarum Agronomy, 36: 147-158.
- Larbi, A., El-Moneim, A.M., Nakkoul, H., Jammal, B., Hassan, S., 2011. Inter-species variations in yield and quality determinants in *Vicia* species: 3. common vetch (*Vicia sativa* ssp. *sativa* L.). Animal Feed Science and Technology, 164: 241–251.
- Mao, Z., Fu, X., Nan, Z.B.H., Wan, C.G., 2015. Fatty acid, amino acid, and mineral composition of four common vetch seeds on Qinghai-Tibetan plateau. Food Chemistry, 171: 13–18.
- Marini, F., Magri, A.L., Balestrieri, F., Fabretti, F., Marini, D., 2004. Supervised pattern recognition applied to the discrimination of the floral origin of six types of Italian honey samples. Analytica Chimica Acta, 515(1):117–125.
- Maxwell, A.E., Warner, T.A., Fang, F., 2018. Implementation of machine learning classification in remote sensing: an applied review. International Journalal Remote Sensing, 39: 2784–2817.
- Mikic, A., Peric, V., Dordevi Srebric, M., Mihailovic, V., 2009. Anti-nutritional factors in some grain legumes. Biotechnology in Animal Husbandry, 25: 1181–1188.
- Mollazade, K., Omid, M., Arefi, A., 2012. Comparing data mining classifiers for grading raisins based on visual features. Computers and Electronics in Agriculture, 84:124–131.
- Nettleton, D.F., Oriols-Puig, A., Fornells, A., 2010. A study of the effect of different types of noise on the precision of supervised learning techniques. Artificial Intelligence Review, 33: 275–306.
- Omid, M., Khojastehnazhand, M., Tabatabaeefar, A., 2010. Estimating volume and mass of citrus fruits by image processing technique. Journal Food Engineering, 100(2): 315–321.
- Pietersma, D., Lacroix, R., Lefebvre, D., Wade, K.M., 2003. Performance analysis for machine-learning experiments using small data sets. Computers Electronics in Agriculture, 38(1): 1–17.

- Pinkerton, B., Pinkerton, F., 2000. Managing forages for meat goats. In: Meat goat production handbook. Extention services. Collage of Agriculture, Forestry and Life Science, Clemson University, USA.
- Ponce, J.M., Aquino, A., Millán, B., Andújar, J.M., 2018. Olive-fruit mass and size estimation using image analysis and feature modeling. Sensors, 18(9): 2930.
- Rodríguez-Galiano, V.F., Ghimire, J., Rogan, B., Chica-Olmo, M., Rigol-Sánchez, J.P., 2012. An assessment of the effectiveness of a Random Forest classifier for land-cover classification. ISPRS J Photogramm Remote Sensing, 67: 93–104.
- Romero, J.R., Roncallo, P.F., Akkiraju, P.C., Ponzoni, I., Echenique, V.C., Carballo, J.A., 2013. Using classification algorithms for predicting durum wheat yield in the province of Buenos Aires. Computers Electronics in Agriculture, 96: 173–179.
- Sağlam, C., Çetin, N., 2022. Machine learning algorithms to estimate drying characteristics of apples slices dried with different methods. Journal of Food Processing and Preservation, e16496.
- Saha, K.K., Uddin, M.Z., Rahman, M.M., Moniruzzaman, M., Ali, M.A., Oliver, M.M.H., 2021. Estimation of cardamom capsule size and surface area using digital image processing technique. Journal of the Bangladesh Agricultural University, 19(3): 398-405.
- Sahay, K.M., Singh, K.K., 2004. A textbook on unit operation of agricultural processing.
- Singh, S.K., Vidyarthi, S.K., Tiwari, R., 2020. Machine learnt image processing to predict weight and size of rice kernels. Journal of Food Engineering, 274: 109828.
- Stegmayer, G., Milone, D.H., Garran, S., Burdyn, L., 2013. Automatic recognition of quarantine citrus diseases. Expert Systems Applications, 40(9): 3512–3517.
- Tabatabaeefar, A., Rajabipour, A., 2005. Modeling the mass of apples by geometrical attributes. Science Horticulture, 105(3): 373–382
- Taser, O.F., Altuntas, E., Ozgoz, E., 2005. Physical properties of Hungarian and common vetch seeds. Journal of Applied Sciences, 5(2): 323-326.
- Varol, İ.S., Çetin, N., Kirnak, H., 2022. Comparative evaluation of quality properties of chickpea seed (*Cicer arietinum* L.) grown under different irrigation conditions by using machine learning. Journal of Agricultural Sciences, 1: 12.
- Wang, X., Zhang, H., Song, R., He, X., Mao, P., Jia, S., 2021. Non-destructive identification of naturally aged alfalfa seeds via multispectral imaging analysis. Sensors, 21(17): 5804.
- Witten, I.H., Frank, E., 2005. Data mining: practical machine learning tools and techniques. Morgan Kaufmann Press, San Francisco.
- Xu, G., Shen, C., Liu, M., Zhang, F., Shen, W., 2017. A user behavior prediction model based on parallel neural network and k-nearest neighbor algorithm.

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- ms. Cluster Computing, 20(2): 1703-1715.
- Xu, P., Yang, R., Zeng, T., Zhang, J., Zhang, Y., Tan, Q., 2021. Varietal classification of maize seeds using computer vision and machine learning techniques. Journal of Food Process Engineering, 44(11): e13846.
- Yalçın, İ., Özarslan, C., 2004. Physical properties of vetch seed. Biosystems Engineering, 88(4): 507-512.
- Yang, L., Zhang, Z., Hu, X., 2020. Cultivar discrimination of single alfalfa (*Medicago sativa* L.) seed via multispectral imaging combined with multivariate analysis. Sensors, 20(22): 6575.
- Zhang, H., Song, T., Wang, K., Wang, G., Hu, H., Zeng, F., 2012. Prediction of crude protein content in rice grain with canopy spectral reflectance. Plant, Soil and Environment, 58: 514–520.