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Dear readers,

With every new edition of the *Horizons* scientific journal, the academic public has become used to the expectation that it traces new pathways towards its further establishment in the international educational and scientific –research areas.

For the coming period, just as it did previously, *Horizons* will continue to respect the principles of scientific impartiality and editorial justness, and will be committed to stimulating the young researchers in particular, to select *Horizons* as a place to publish the results of their contemporary scientific and research work. This is also an opportunity for those, who through publishing their papers in international scientific journals such as *Horizons*, view their future carrier development in the realm of professorship and scientific-research profession. The internationalization of our *Horizons* journal is not to be taken as the furthest accomplishment of our University publishing activity. Just as the scientific thought does not approve of limitations of exhaustive achievements, so is every newly registered success of the *Horizons* editions going to give rise to new "appetites" for further objectives to reach.

Last but not the least, we would like to express our sincere appreciation for the active part you all took in the process of designing, creating, final shaping and publishing the scientific journal. Finally, it is with your support that *Horizons* is on its way to attain its deserved, recognizable place where creative, innovative and intellectually autonomous scientific reflections and potentials will be granted affirmation, as well as an opportunity for a successful establishment in the global area of knowledge and science.

Sincerely,

Editorial Board

CONTENT

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FACTORS THAT AFFECT THE TAG-BASED COLLABORATIVE FILTERING[1]

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Abstract

Selecting the most useful learning content is important aspect in the modern e-learning systems as well as distributing learning content in adequate format. It means that e-learning systems need to have ability to determinate student needs and their most adequate learning style. Our previous researches were focused on tag-based collaborative filtering and learning style determination in order to suggest useful learning material in adequate format and we have proposed an algorithm for tag-based collaborative filtering. In the scope of this paper we are focused on factors that affect the process of tag-based collaborative filtering. In that content, we have taken in consideration students ratings, tags ratings and materials ratings as factors that have impact on the tab-based collaborative filtering.
Keywords – factors, collaborative filtering, tags, recommendation.

INTRODUCTION

The volume of learning materials available in e-learning systems is rapidly increasing. This abundance of information has created the need to help students use resources that match their individual goals, interests and current knowledge [1]. That's why personalized searching becomes important and challenging from one hand, and very useful in practice on the other hand. Using techniques for selecting the most adequate learning materials in e-learning systems is very useful and practical. Also, learning materials are available in different formats suitable for learners with different learning styles.

[1] original scientific paper

Recommendation systems aim to improve the users' search experience. But as observed by recent research, traditional implementations of classical recommended approach, such as collaborative filtering, are not working well in this new context [2]. Collaborative tagging systems allow users to annotate resources with their custom tags, which provide a simple but powerful way for organizing, retrieving and sharing different types of social resources [3]. There are several algorithms for collaborative filtering and different metrics used in order to calculate the similarity between the two items. In the area of e-learning systems, it is necessary to take into consideration the fact that all learners have different ratings, some tags are used more often than other tags, some learning materials are more popular than other learning materials and so on. Therefore, we need to think about factors that have impact in the process of collaborative filtering.

RELATED WORKS

There are a lot of authors focused on collaborative filtering, especially filtering based on tags. Some of them were using different measures in collaborative filtering, different algorithms and so on. Also, there are several papers intended to factors that impact the collaborative filtering. In [4], the authors were focused on the importance and usefulness of tags and time information when predicting users' preference and examine how to exploit such information to build an effective resource-recommendation model. They show that tags and time information can well express users' taste. Additionally, they conclude that better performances can be achieved if such information is integrated into collaborative filtering. The authors in [2] have developed and evaluated two enhancements of user-based collaborative filtering algorithms to provide recommendations of articles on Cite ULike. The result obtained after two phases of evaluation suggests that both enhancements are beneficial. Incorporating the number of raters into the algorithms, based on the same research, leads to an improvement of precision, while tag-based BM25 similarity measure, an alternative to Pearson correlation for calculating the similarity between users and their neighbors, increases the coverage of the recommendation process. Authors in [3] were focused on limitations of previous tag-based personalized search. They proposed a new method to model user profiles and resource profiles in a collaborative tagging environment. A novel search method using such users' and resources' profiles is proposed to facilitate the desired personalization in resource search. Also, they implemented a prototype system named as FMRS. Based on the results, they conclude that the

proposed method outperforms baseline methods. In [5], authors studied different tag-based collaborative filtering recommendation. For that purpose, they implemented 16 different tag-based collaborative filtering recommendation algorithms, memory based as well as model based, and compared them in terms of accuracy and user satisfaction. The results of the conducted offline and user evaluations reveal that the quality of user experience does not correlate with high-recommendation accuracy. The authors in [6] extend the SPARFA framework significantly in order to enable the exploitation of tags/labels for questions that partially describe the question. The resulting Ordinal SPARFA-Tag framework greatly enhances the interpretability of the estimated concepts. They were using a real educational data that Ordinal SPARFA-Tag out-performs both SPARFA and existing collaborative filtering techniques in predicting missing learner responses. Authors in [7] proposed more recommendable tags, which have numerical interactions with users, to refine users' tag preference first, and then deliver quality item recommendations based on the global relationship between tags and items. In [8], authors proposed a new approach to compute users' similarities and they are focus on tag ratings. Based on the results from their survey, they summarized that rating tags has influence for more effective collaborative filtering. In order to improve their previews system, authors in [9] coupled 5-star ratings with commenting to increase the cost and complexity of evaluating and gave students individual presence with nicknames to increase social presence and enable reputation formation. The result shows that high enough cost of evaluating together with high enough social presence can lead to complete honesty in evaluations and enhance both user experience and students involvement. Authors in [10] were focused on giving tag recommendations for students. Based on the results, they conclude that selecting tag from the suggested list instead of adding tags by using free text field impact in simplifying the tagging process and in improving its quality. The authors in [11] present a tag-based collaborative filtering recommendation method to use with recently popular online social tagging systems. Based upon testing, their system provides a higher level of relevant recommendations over other commonly used search and recommendation methods. The authors in [12] pinpoint three tasks that would benefit from personalization: collaborative tagging, collaborative browsing and collaborative search. They propose a ranking model for each task that integrates the individual user's tagging history in the recommendation of the tags and content, to align its suggestions to the individual user preferences. They demonstrated on two real data sets that for all three tasks, the personalized ranking should take into account both the user's own preference and the opinion of others. In paper [13], the authors analyze a

database of records found on Bibsonomy, CiteULike and Connotea and explored the tripartite connection of users, documents and tags by three measurement methods.

SYSTEM OVERVIEW

Using techniques to detect the learners' needs and find out the most adequate learning materials in e-learning systems is useful from several aspects – it recommends the most useful learning materials to the learners and it produces more effective learning process [14]. Learning materials are available in different formats (text, audio, video, practical examples, external link, presentations and etc), but also learners have different learning styles. That's why, in [15] we have implement an intelligent system for e-learning that suggests the most useful learning materials and delivers the learning material based on the most adequate learning style to the students. The system uses VARK questionnaire for learning style determination and was implemented in the educational process in Faculty of Law in Bitola. Tag-based collaborative filtering is using to filter the most adequate learning materials for the logged student. Based on the results in [15], using tags in the process of learning materials recommendation is useful and valuable technique.

This paper focuses on factors that affect the process of tag-based collaborative filtering like: student rating, tag rating, materials rating and student learning style. In order to measure the effect of the factors, first we need to calculate student's rating, tags and learning materials.

Generally, students, tags and learning materials' rating is calculated based on student activity (used learning materials and added tags).

A. Student rating

In order to determinate the student rating, we have introduced two coefficients: knowledge level coefficient (Ckl) and student activity coefficient (Csa). Total student rating can be calculated as an average value of the two coefficients.

$C_{kl} = \sum\left(\frac{Pn}{Nt} * K_{ln}\right)$ where Pn is a score from the test of knowledge level Kln and Nt is the maximum number of test points.

$C_{sa} = \frac{Tsu}{Tt}$ where Tsu is number of total tags posted from the student s, while Tt is total number of tags posted from the other students for learning materials tagged by student s.
Student rating Srat can be calculating as:

$$S_{rat} = \frac{Ckl + Csa}{2}$$

B. Tag rating
Tag rating Tr can be calculate as:

$$T_r = \sum\left(\frac{Tslm}{Ntlm} * S_{rat}\right)$$

Where Tslm is a number of tags added from the student s to the learning material lm, Ntlm is a total number of tags added for the learning material lm and Srat is rating of the student S.

C. Learning materials rating
Average material rating (LMr) can be calculated as an average value of two coefficients: average rating posted from the students (Rav) and students' average rating that post rating to learning material (Rsav):

$$LM_r = \frac{Rav + Rsav}{2}$$

RESULTS

In order to review the factors that impacts the tag-based collaborative filtering, our system was implemented at Faculty of Law at Bitola. The survey covered subject from undergraduate studies. The implemented system contains total 98 learning units, each of them composed from video, audio, text and examples and demonstrations. The system was used from 68 students. In the

scope of this paper we are focused of factors that affect the process of tag-based collaborative filtering like: student rating, tag rating and materials rating.

A. Student rating

In the implemented system, the students can add their tags to the selected learning materials. In that manner, students can add tags via free text field or select tags from suggested list of tags. To generate and propose to the student a list of a recommended tags that can be posted to some learning material, the system uses tags posted from students with similar user profiles and completes following steps to generate the list:

- Determine the similar profiles with registered students' user profiles
- Generate the list of tags used by the students selected in step
- Determine the difference between the list from step 2 with the tags that student has already posted for the opened learning content
- Showing the list generated in the step 3

In order to check if students' rating has an impact on tag-based collaborative filtering, we have implemented modules that generate and propose to students two lists with tags. The first list contains tags related to the selected learning material, added by N students with highest rating. The second list contains tags related to the selected learning material but added by N students with lowest rating. While using the system, students selected total 198 tags from the first list and 114 tags from the second list. It means that the rating of students that added tags has an impact to the process of suggesting tags. In other words, if a student A has highest rating that a student B, than tags added from the student A are more useful and reliable than tags added from the student B.

B. Tag rating

The main goal of the implemented system is to filter and recommend the most adequate learning content to the students based on their needs. To archive that, the system uses tag-based collaborative filtering. Based on common used tags, the system can calculate similar learning materials. In order to check how tags' rating has an impact on collaborative filtering, the system recommends to students two lists with learning materials. The first list contains learning materials selected with collaborative filtering based on the tags with the highest rating. The second list contains learning materials selected with collaborative filtering based on the tags with the lowest rating. Based on the results, tag rating has an influence in the process of tag-based collaborative filtering, because

students selected 249 learning materials from the first list and 127 learning materials from the second list.

C. Learning material rating

The implemented system for e-learning contains 98 learning materials, each of them with different rating. In order to detect how learning material rating affect the e-learning process, we generate two lists with learning materials: first list contains learning materials with the highest rating and the second list with the smallest rating.

Based on the results, we can conclude that the rating of the learning materials has influenced the process of tag-based collaborative filtering. The results show that the student selected 214 learning materials from the first list and 112 learning materials from the second list.

Factor	Selected items from the list (lower rating)	Selected items from the list (higher rating)
Student rating	198	114
Tag rating	249	127
Learning materials ratings	214	112

Table 1: Student activities

D. Results from questionnaire

In the scope of this paper, the students filled out the questionnaire with several questions. According to the given answers, we can conclude that students accept the fact that tags and learning materials with high rating are more useful. In addition, they agree that recommendation list for learning materials based on student activities with high rating is more useful versus recommendation list for learning materials based on student activities with low rating.

	(1 – dissatisfied, 5 – satisfied)

Question	1	2	3	4	5
Suggested learning materials with low rating were useful	28	22	6	8	4
Suggested learning materials with high rating were useful	4	1	3	28	32
You used some of suggested tags with low rating	33	17	10	2	6
You used some of suggested tags with high rating	2	3	8	11	44
Suggested materials tagged by student with low rating were useful for you	37	13	9	4	5
Suggested materials tagged by student with high rating were useful for you	4	3	7	14	40

Table 2: Results from the questionnaire

CONCLUSION

Recommender systems can provide an effective mechanism to deal with the information overload problem in e-learning systems. The success of e-learning systems depends on selecting and providing adequate learning materials to the learners, according to their requirements, need and goals. Additional, searching for an adequate learning material in a large dataset without some techniques for filtering and recommendations is almost impossible and leads to inefficient learning process. In our previous research we have implemented an intelligent e-learning system that classifies students based on their learning style so that the learning materials are delivered in the most adequate format. The focus of this paper is on factors that affect the process of tag-based collaborative filtering like: student rating, tag rating and learning materials rating. The system calculated the rating of the tags, learning materials and students first. Then, the system was generating two lists based on ratings. After a period of using the system, we have compared the results obtained from the student's activities and we can conclude that students, tags and learning material ratings have an influence in the tag-based collaborative filtering. Suggested learning materials with higher rating were more used versus suggested learning materials with lower rating. The same applies to tag rating. Tags with high rating are more valuable then tags with lower rating in tab-based collaborative filtering. Finally,

student rating has an impact on the collaborative filtering because learning materials tagged from the student with the highest rating were more used than learning materials tagged from the student with the lower rating.

As a part of future researches, it's possible to extend the list with factors that have impact to tag recommendation process as well as the opportunity to including additional algorithms for collaborative filtering and comparing the results.

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COMPUTER PROGRAM FOR STUDENTS KNOWLEDGE ASSESSMENT[2]

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Abstract

The main emphasis for the improvement of the educational process is the implementation of the Information and Communication Technology (ICT). In other words, ICT presents using digital technology, communication tools and networks for access, managing, integrating, evaluating and creating information in order to acquire knowledge. Therefore a software is made that provides objectivity in assessment, quick and efficient overview of results, quick and easy preparation of tests and shortening the time needed to review.

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[2] professional paper

Key words: ICT - Information and Communication Technology, education.

INTRODUCTION

The process of human development, its education and upbringing, presents an acquirement of knowledge, skills and abilities in connection with the ways of satisfying the needs, life and work experiences; the formation of attitudes, development of critical attitude towards the job and following the established values. The education is a process of planning, programming, organizing and executing the educational activity as well as other educational forms of working with the pupils/students.

The changes, nowadays more common in education, are a result of the development of technique and technology. It is manifested with changes in the educational activity; changes in the role of the pupil/student, who transforms from a passive listener into an active one, as well as changes in the role of the teacher, who, from an authoritarian lecturer, transforms into a coordinator and a mentor. The education as a process is very long and it is followed by the development and changes that are crucial factor in every society.

The main emphasis, in the improvement of the educational process, is on the implementation of ICT (Information and Communication Technology). In other words, ICT presents the use of digital technology, communicational tools and networks for: access, management, integration, evaluation and creation of information for acquiring new knowledge.

The informational system presents a unit in which the information aimed at people is gathered, stored, processed and produced, in order to increase people's knowledge and enable them easier decision making, implementation and control of those decisions and more effective life.

Every country should promote and support the use of ICT in education in order to improve its quality and efficiency. The Ministry of Education and Science should have a vision in which all the participants in the educational process will learn to use ICT not only for studying, research, and career development but will also learn how to implement it.

The Ministry of Education and Science already uses similar software for the external evaluation of the students. This paper intentionally does not cover

the problems that software has (if any) in order to make a different software that has no connections with the already used software. The intention was to make a software for internal use on one of the faculties of the University "Ss. Kliment Ohridski" for certain subjects, and then if other faculties are interested, its expansion will follow. By publishing this paper, that is the goal we strive to achieve - expansion and visibility of this software.

The aim of this thesis is to enable objectivity in the process of evaluation in order to avoid the suspicions of subjectivity of the professors, fast and effective examination, fast and easy test preparation, and shortening of the evaluation time.

COMPUTER PROGRAM

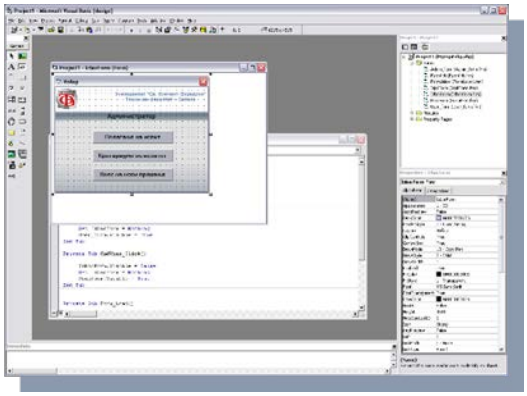
The creation of this application starts with the creation of the forms in the editor of Visual Basic and the tools that are part of the editor.

The used literature that is listed on the end of this paper, is used for education and research purposes of the authors of this paper, but the conception and the work that this software is meant to achieve is creativity and an idea from the authors. Of course that this idea, if needed can be subject to changes (improvements).

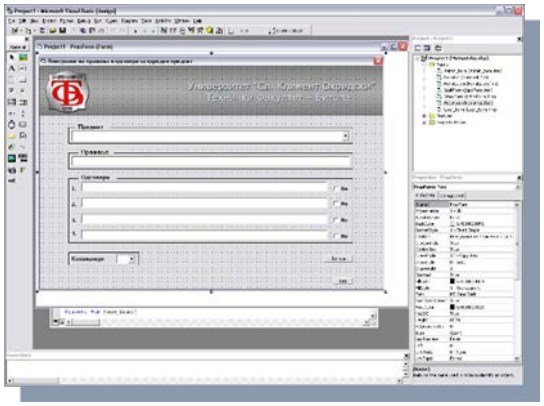
When loading or opening the form on the first screen, the path and location of the application is established. This is done so that the exam results are recorded in the same place. The data base, if there is one and its attributes is checked. If it is invisible in the folder it should be made visible. If there isn’t a data base, (this is used when the data base is created for the first time) it is created on the same location as the application. After the creation of the data base, starts the creation of the table for the subjects, the questions, the exam (table that is filled with questions acquired by random choice from the overall exam questions), answers (table where all the answers are recorded), results (table where the results are recorded at the same time when the examinee chooses his answer), criteria (table which determines the exam or colloquium criteria).

HOW THE CODE WORKS

On start up, the table „Criteria“ is also opened and it is used for inserting the data or criteria for the exam: the subject; the professor, name and surname of the examinee, index number, what is taken, exam or colloquium, if it is a colloquium, which one it is (first or second), how many questions the exam contains and how long it will take. After inserting all the data, the table **Criteria** is closed and the table Exam Questions is opened. All the questions for the subject are inserted in this (whether it is an exam or a colloquium). This table is filled with all the questions for the given subject**.**



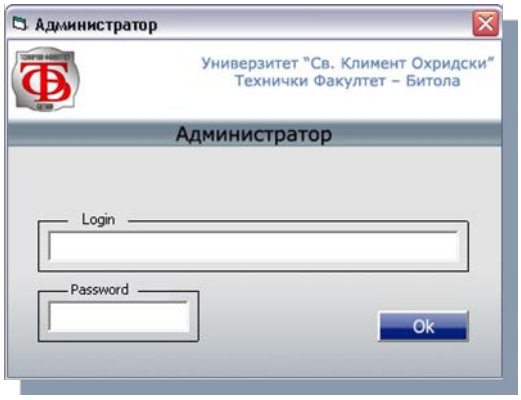
Pic. 1. VB editor (Criteria)



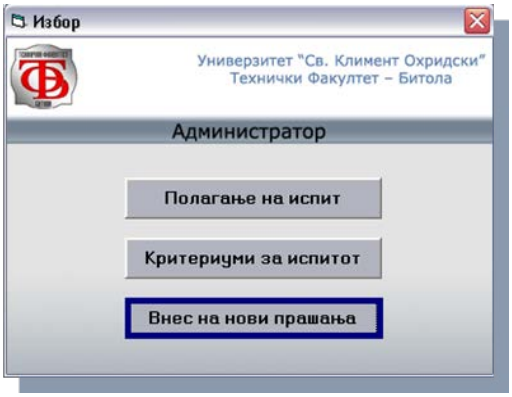
Pic. 2. VB (input new questions)

HOW THE ADMINISTRATOR RUNS THE APPLICATION

The application is done in a way to recognise the computer where it is located. This is done in order to protect the application in a way that only certain people can insert questions in the data base. That means once the application is run, the administrator, in this case the professor, will receive the form presented in picture 3. After logging in with his own name, surname and password, which he will choose himself, he will receive the form presented in picture 4.

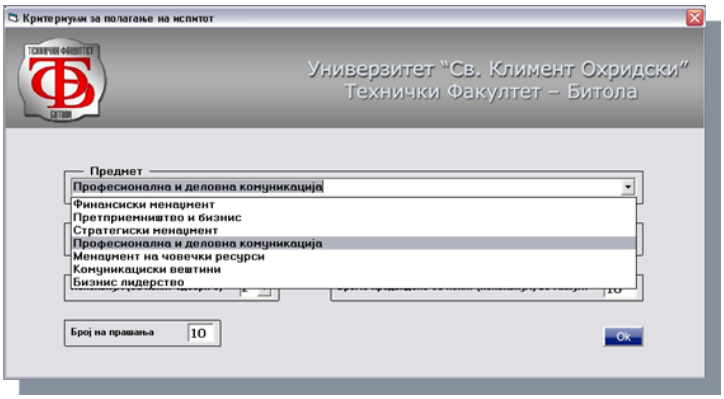


Pic. 3. Administrator

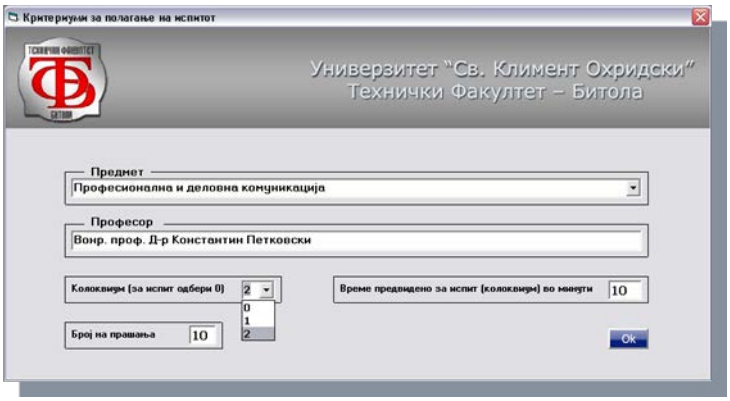


Pic. 4. Insert new questions

The subject selection is presented in picture 5 and all the other parameters for the exam in picture 6. As presented in the picture, it means that second colloquium will be taken (number 2 is selected), it will last for 10min. and the total number of exam questions is 10.



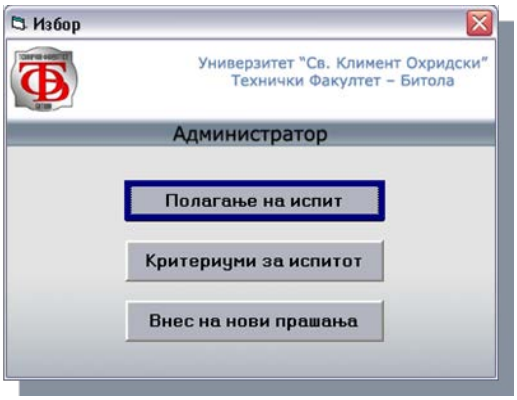
Pic. 5. The subject selection



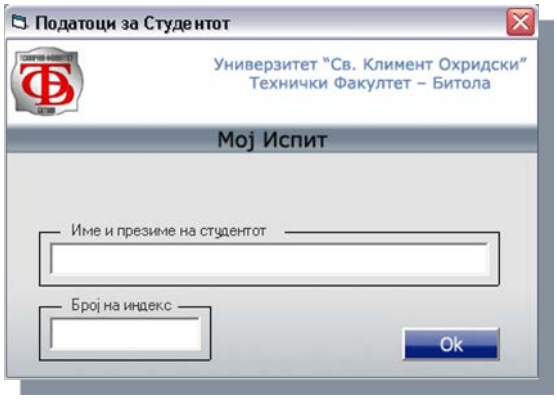
Pic. 6. Criteria selection (second colloquium)

HOW THE STUDENTS RUN THE APPLICATION

The administrator can run the application from the menu „Choice“ by clicking the „Taking an Exam“ button, presented in picture 7. In case of running the application on another computer, other than the administrator’s, it can be run by the form presented in picture 8 “Student data”.



Pic. 7. Taking an Exam



Pic. 8. Student data

This is the start up form for examination. The examinee cannot exit this form that is he cannot end it.

This means that the examinee has to enter his data; name, surname and index number in order to continue with his exam. The entering of the data can be done in a Latin or Cyrillic font, depending on the options and settings of the computer.

After entering the data and clicking the „OK“ button, the examinee receives the form for accepting the examination terms.

In this way the examinee is notified of the basic examination rules. The examinee is obliged to read and comply with these rules. In order to start his exam, he has to click the checkbox, after which the sentence „I accept the examination terms” is marked. After accepting the terms, the examinee clicks the „OK“ button and the exam will start.

Once this form appears on the screen (it appears on the entire screen) the examinee cannot exit the application, except for the forward-backward buttons which he can use for going through the questions. The examination time can be controlled on the upper right corner of the screen. The answering of the questions is done by clicking the checkbox located in front of each question. After clicking the checkbox the text from the question changes its colour, by which the examinee can visually see whether that question has been answered. The examinee can change his answers before the ending of the exam if he thinks he has given a wrong answer to a question. All the answers are recorded in the table „Results“ and are placed in a separate text file with the name and surname of the examinee, the date and the time of the exam. The exam is considered completed when on the form appears a message in which the examinee can immediately see how many questions he has answered correctly and how many points he has scored. If he doesn’t have enough correct answers he will receive a message saying that he doesn’t have enough correct answers.

A text file is also written in the folder where the application is located, in which the questions and answers are recorded, with marks which one is correct and which one is incorrect.

At the same time when the examinee receives this message on the screen, these results are exported to an Excel table, with the name and surname of the examinee, his index number, what he has taken (an exam, first or second colloquium) and the points he has scored. The professor also immediately receives an Excel table with the results from the examinees who have taken the exam that day, as in table 1.

Table. 1. Results of the examinee

		Професионална и деловна комуникација			
р. бр.	**индекс**	**Презиме и име**	**I кол.**	**II кол.**	**испит**
1	1081	Благој Ристовски		72	
2	1082	Кире Поповски		0	

CONCLUSION

The process of modernization of education in Macedonia that has been in progress for a long time is very popular at the moment. As a result of this the educational institutions are being modernized with new infrastructure, new

teaching aids and devices and different training programs are being implemented, many of which are in close connection with the “Implementation of ICT in education”.

Lately, most of the training sessions are aimed at the use of computers in the educational process, starting with the use of computer technology in the process of teacher’s preparation and planning; through integration of computers in the educational process itself by which the pupils/students are the ones that use the computers in order to facilitate their acquirement of new knowledge and improve the knowledge they have already gained. The students/pupils are the biggest potential that comes into our classrooms and is capable of working with technology on different issues. The students show enormous interest and motivation for work in the activities in which ICT is included. That is why we should be very careful in the proper directing towards constructive work in the use of information and communication technologies.

Expected results? The development of information technology has greatly highlighted the question for promotion of new and modern applications. In the same context is also this application for electronic examination whose implementation will enable fast and easy creation of interactive tests based on easy to use forms; by which the time for test preparation and evaluation will be shortened; that will also ensure complete objectivity in the process of evaluation; the printing costs will be avoided and it will allow free and easy access to the results.

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OBTAINING REFINED SUNFLOWER EATABLE OIL AND QUALITY CONTROL[3]

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ABSTRACT

Refined and raw oil have several differences including: color, taste, smell, chemical composition, nutrition components and lasting. With refining raw oil, refined oil is produced. Following writing is analysis of raw and refined sunflower oil "Kristal" produced in a food factory "Blagoj Gjorev" in Veles. We analyzed the certain parameters: iodine, peroxide, acid and saponification value, moisture and volatile matter, sediment and insoluble substances, soaps, phosphatide and specific weight in raw and refining oil. The moisture in raw oil is 0,6%, sediment and insoluble substances 0,2% and phosphates are represented whit 200 *mg/kg*, while in refined oil these values are 0. During refining, the acid value is getting lower from 2, 26 *g/kg* in raw oil to 0,15 *g/kg* in refined oil. The specific weight is also getting lower during refining process, from 0,925 *g/ml* to 0,921 *g/ml*. All results are within allowed values, meaning that refining of eatable oil "Kristal" is successfully done.

Key words: sunflower oil, refining, analyses, quality

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[3] review scientific paper

INTRODUCTION

Sunflower (*Helianthus annuus L.*,) is the most important resource for oil production, originating from North America and is one of four the most important oilseeds in the world. It was brought in Europe at the beginning of 16 th century as a decoration plant. In 1716, sunflower was patented as resource for oil production in England [1]. Science development and its hybrid creation have increased the seed production and the quality of this kind of oil. In the beginning of the first half of 20 th century, the sunflower was cultivated on large areas and was used as food oil.

Today the commercial hybrid can contain up to 50 % oil. The largest part, from 40-60 % of the oil is found in the seed (% dry matter), kernel 50-70 % and shell 2, 5-4, 5 %. However, the percentage depends of hybrid type location, condition and the way of cultivation [2].

MATERIAL AND METHODS

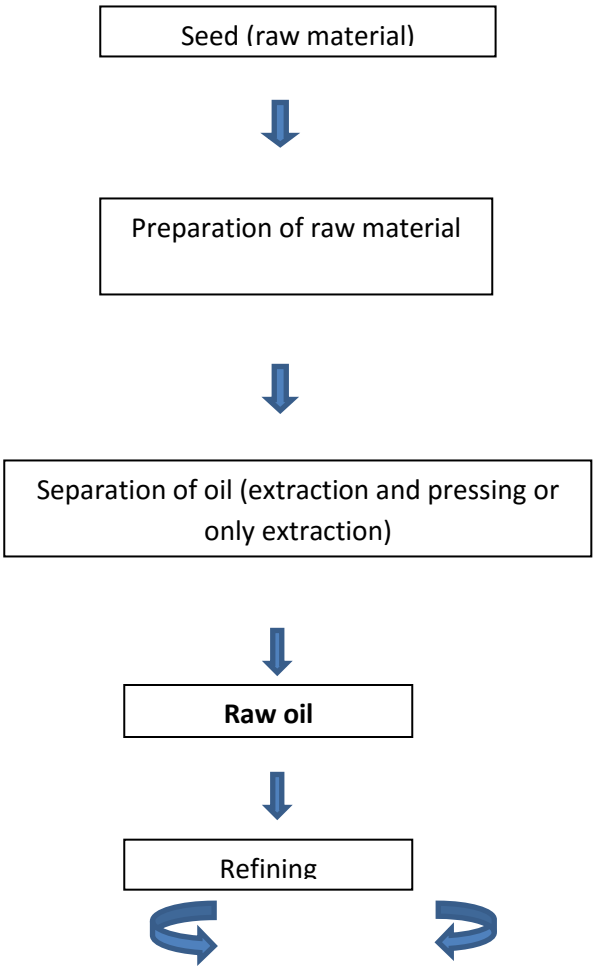
In this paper, we have analyzed the sunflower oil "Kristal", manufactured by food industry "Blagoj Gjorev" in Veles. The technology for obtaining raw oil includes technological process starting with acceptance of raw material until its house storage.

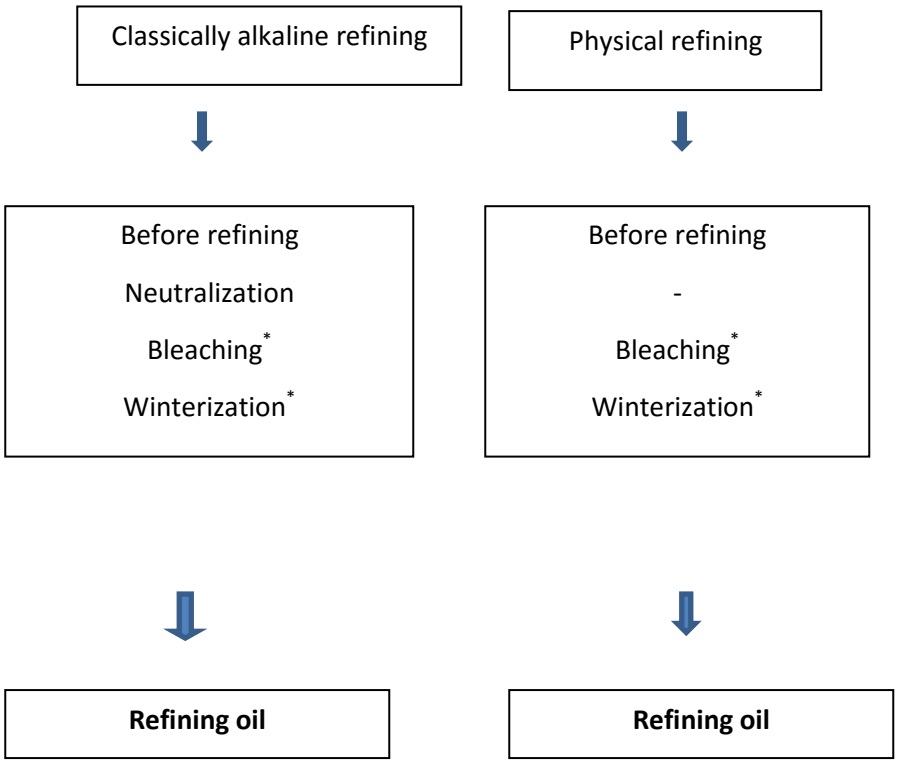
Aiming to have high quality eatable oil, attractive to costumers (with pleasant taste, smell and color, without lees) and longer lasting time, it has to be refined through a series of processes known by common name: refining.

To refine oils, classical alkaline and physical refining are used. Classical alkaline refining is composed of following actions: before refining, neutralization, bleaching, winterization, deodorization, cooling and clarification of the oil. Depending on oil quality, not all actions are used. During the production of the "Kristal" oil, bleaching and winterization are not used, instead continuous neutralization is used, as well as polycontinuous deodorization.

Before refining is the first stage of refining which includes the elimination of phosphoglycerol, phospholipids and other mucus substances with the addition of phosphoric acid. The before refining is not required process because the phosphatides can be removed by the next stages of refining. Neutralization is the process of removing free fatty acids which are formed by the hydrolysis of triacylglycerols. The free fatty acids are removed by using NaOH, in the form of soluble soaps.

The technological scheme for obtaining raw and refining oil is shown on scheme 1.





Scheme 1. Technological scheme of obtaining raw and refined oil [3]

*These phases of refining are applied when necessary depending on the type and quality of raw oil

The sunflower oil “Kristal” from “Blagoj Gjorev”, Macedonia analyzed in this work is produced using cutting edge technology and high quality sunflower seed.

As a result of the process we get refined oil with characteristic (light) color and neutral smell and taste, with defined quality parameters in compliance with legislative. In order to determine the quality of refined sunflower oil, analyzed are the following parameters: moisture and volatile matter, sediment and insoluble substances, soaps, phosphatide and specific weight. Analyzed values are: acid value, iodine value, saponification and peroxide value.

We have analyzed raw sunflower oil, stored in vertical cylindrical storage tanks. From the tanks taken were three samples, from “top", "middle" and "bottom “of the tank. Sampling is done in accordance to JUS E.K8.020/1991 standard and all samples were homogenized.

For determination of moisture and volatile matter in the oil following methods are used ISO 662:2001.

Insoluble substances in oil are determined with the standard method ISO 15301: 2001. Determination of the soap was made with AOCS Cc 17-96/97 method. The content of phosphatides is obtained by calculation i.e. by multiplying the amount of phosphorus in a percentage whit conversion factor [4]. One of the parameters for monitoring the quality of raw and refined oil is acid value, or determination of free fatty acids and that value is law regulated. For determinations of acid value is used method ISO 660:2009.

The specific weight of oil is determined with the method ISO 6883: 2000. Iodine value of raw and refined oil is analyzed with the method ISO 3961: 1996. Saponification value is determined with the method ISO 3657: 2002. Occurrence of oil oxidation and creating peroxides are monitored through peroxide value. In raw oils peroxide value, as a measure of quality, is not limited by legislation and therefore does not analyze [5]. Peroxide value of raw and refined oil is determined by the standard method ISO 3961:1996.

RESULTS & DISCUSSION

The results for the analyzed parameters of raw and refined sunflower oil are presented in Table 1.

Table 1. Analysis of raw and refined sunflower oil "Kristal"

Parameters / units of measurement	Raw sunflower oil	Refined sunflower oil	Refined sunflower oil according to a Rulebook of R. Macedonia [5]
Moisture and volatile matter (%)	0,6	0	max 0,2
Sediment and insoluble substances (%)	0,2	0	/
Soaps (*mg/kg*)	/	10	max 50
Phosphatide (*mg/kg*)	200	0	/
Acid value (*g/kg*)	2,26	0,15	max 0,3
Iodine value	128	130	118-141
Saponification value (*mg KOH/g*)	190	190	188-194
Peroxide value (*mmol* O_2*/kg*)	/	1	max 5
Specific weight (*g/ml*) **(**ºC/20)	0,925	0,921	0,918 -0,923

The contents of moisture (water) and volatile substances is an important indicator of the quality of raw and refined oil [6]. The presence of water may result in hydrolytic changes with increasing acidity i.e. content of free fatty acids and reduce the quality of the oil [7]. Moisture and volatile substances in raw oil are 0,6 %, while in the refined oil is 0 % because oil deodorization is done on 230°C, all volatile substances, including moisture are removed [8].

In raw oil, sediment and insoluble substances are 0,2%. They can originate from mechanical impurities in the raw material or equipment and machinery for processing raw material and various products of chemical reactions that take place in oil and raw material itself [7]. According to the Rulebook of the quality of vegetable oils in the R. Macedonia in refined oil it is not allowed any presence of sediment and insoluble substances [5]. After conducting refining, sediment and insoluble substances are completely removed from the analyzed oil and amount is 0%. The overall amount of sediment and mechanical impurities are removed during the refining processes by bleaching, neutralization and filtration [9].

During the classical alkaline refining, free fatty acids from the raw oil are removed using a base (NaOH), in the form of soaps that are soluble in water [7]. Refined oil that is released for sale under Rulebook of quality for vegetable oils should contain a maximum up to 50 *mg/kg* soaps. The resulting value of 10 *mg/kg* soap in refined sunflower oil showed in table 1 meets the criteria for quality oil. Soaps in raw oil are not determined, because soaps are crated during neutralization process of refined oil.

Phospholipids, as an important indicator of quality, appear only in raw oils. For refined oils they are not significant, because they completely removed during refining. During the processing of sunflower seed by extraction and extrusion, under the influence of heat, moisture or solvent, phosphatides converted into oil [7]. Their content depends on the amount of phospholipids in seeds, the level of maturity and storage conditions of the seeds and the method of technological separation of oil. Phosphates are removed during the process of neutralization and quality refined oil should not contain any phosphates. Our analysis of raw and refined oil showed that phosphatides of 200 *mg/kg* in raw oil are completely removed during refining and refined oil amount to 0 *mg/kg*.

The free fatty acid is an important parameter for determining the quality of refined oil. In the process of neutralization and deodorization of oil, a substantial part of the free fatty acids present in the oil is removed. The results

presented in table 1 show that there is a substantial neutralization of free fatty acids from 2,26 *g/kg* in raw oil to 0,15 *g/kg* in refined oil.

Iodine value depends on the nature of the oil, and hybrid variety of the raw material from which oil is extracted, the climate, soil quality, etc. [10]. According to the Rulebook on the quality of vegetable oils R. Macedonia, value of iodine value of refined sunflower oil ranges from 118-141 [5]. Iodine value of the analyzed raw sunflower oil is 128 and analyzed for refined sunflower oil is 130, which means that these values are in the allowed limits.

Saponification value is usually a characteristic of raw oil and its value depends on the composition of fatty acids in the oil and the chain length of the fatty acids in the triglyceride molecule. Saponification value in refined sunflower oil under Rulebook of quality vegetable oils should range from 188-194 [5]. As seen in table, the resulting value of 190 for saponification number as identification parameter, shows that the sunflower oil is in allowable limits.

Peroxide value is characteristic parameter and uses as indicators for the primary oxidation of sunflower oil. Hydroperoxides are the primary products of lipid oxidation. Determination of peroxide value can be used as oxidation index for the early stages of lipid oxidation [11,12]. According to the Rulebook of Macedonia the peroxide value higher than 5 *mmol* O_2*/kg* are considered as an unacceptable. From the resulting value for peroxide value 1 *mmol* O_2*/kg* shown in table 1 it can be concluded that the oxidation has not happen or an adulteration of the oil, meaning there are no peroxides as the primary product of oxidation, which means that this refined oil is acceptable for use.

The results in table 1 show that there is a difference in the density of the analyzed raw and refined sunflower oil. Refined oil is rarely with a specific weight 0,921 *g/ml*, and the specific weight of raw oil is 0,925 *g/ml*. The difference in specific weight is because with refining of oil, disposed substances which are part of raw oil such as mucous substances, phosphates, waxes, moisture and volatile solids, sediment and mechanical impurities, some pigments and saturated triglycerides are removed.

CONCLUSION

1. Sunflower oil from “Blagoj Gjorev” AD Veles, Macedonia is analyzed before and after refining. In order to determine the quality of raw and refined oil, we have conducted analyze of following parameters: moisture and volatile matter, sludge and insoluble matter, soap, phosphates, acid value, iodine value, saponification value, peroxide value and specific weight.

2. Raw sunflower oil contains a small amount of moisture and volatile matter (0.6%) and a small amount of sediment and insoluble substances (0.2%) which are completely removed during the process of refining oil. Soaps which are created during neutralization are present in refined oil with10 *mg/kg*, which amount is allowed so the refined oil the quality criteria. The phosphatides and acid value has largest change in value during refining process. Phosphatides found in the raw oil are 200 *mg /kg*, and they are completely removed with neutralization and bleaching. Acid value or free fatty acids in raw oil is present in a high concentration of 2,26 *g/kg* and in the refined oil only 0,15 *g/kg*, as a result of good refining process. The iodine and saponification value of raw and refined oil is not much different and is in accordance with the Rulebook of the quality of vegetable oils in R. Macedonia. The low value for peroxide number of refined oil 1 *mmol* O_2*/kg* shows that refined oil has high stability, there is no auto-oxidation and no peroxide is produced. The lower value of the density of refined oil compared with raw oil is result of removing substances that are part of raw oil.

3. All analyzed parameters are within the limits in the Rulebook for quality of vegetable oils in R. Macedonia.

4. With the process of refining raw sunflower in “Blagoj Gjorev” AD Veles, the sunflower oil “Kristal” is produced with an excellent stability and preserved high quality.

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CANINE MAMMARY TUMORS, PREVALENCE AND PATHO-HISTOLOGICAL CLASSIFICATION[4]

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ABSTRACT

The aim of this investigation was to determine the prevalence of canine mammary tumors in the region of Bitola and Prilep, as well as it's patho-histological classification and prevalence in different breeds of dogs.

According obtained results, it is concluded that from total number of processed mammary tumors, 70% were malignant and 30% were benign. According to the World Health Organization criteria from 2011, the most common tumors in this investigation were complex and tubulopapilary carcinomas, less prevalent were spindle cell carcinomas while mixed carcinomas and sarcomas were absent. Most of the carcinomas (40%) were classified with I grade of malignancy. The most common breeds affected were cross breeds, poodles, cocker spaniels and German shepherds.

Key words: mammary tumors, patho-histological classification, malignancy grade.

[4] professional paper

INTRODUCTION

Canine mammary tumors are the most common neoplasm in these animals and it's occurrence is higher in the countries where routine ovariohisteroctomy is not performed. Mean age of first detection of canine mammary tumors is 10-11 years. According to the histological characteristics, 53% of the canine mammary tumors are malignant.

Canine mammary tumors can be found in every dog's breed, but the most affected are mixed breeds, German shepherds, cocker Spaniels, poodles etc.

There are few patho-histological grading systems of canine mammary tumors, last proposed grading system to the World Health Organization is that from 2011, according to this grading system was made the classification of the tumors in our investigation.

MATERIALS AND METHODS

In this investigation 70 canine mammary tumors were obtained from Bitola and Prilep region. After surgical treatment, tumors were fixed in 10% neutral buffered formalin, then specimens were embedded in paraffin blocks. With hand microtome were made 4 micrometers thick sections from wax blocks. Samples were stained with hematoxylin and eosin(H&E)method.

Mammary tumors in these investigations were taken from different dog breeds: mixed breeds 38, poodles 11, cocker Spaniels 10, German shepherds 8, Pekingese 3.

H&E stained sections of canine mammary tumors were classified by two pathologists, according to the diagnostic criteria proposed by the World Health Organization from 2011.

RESULTS

Table 1. demonstrates the prevalence of different canine mammary tumors

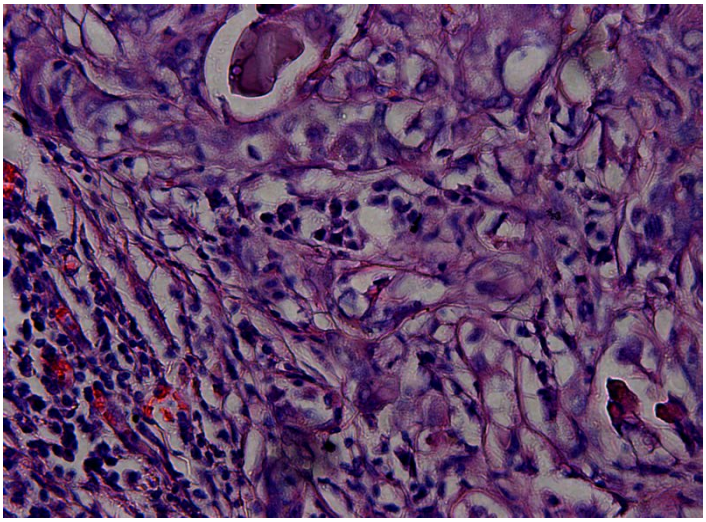
Histological type	Total
Complex carcinoma	20
Simple tubulopapillary carcinoma	7
Simple anaplastic carcinoma	15
Spindle cells carcinoma	7
Adenoma	21
Total	70

As it becomes obvious, by considering the data presented in table 1. we can see that malignant tumors were presented in 49 cases or 70% while benign tumors were presented in 21 cases or 30%.

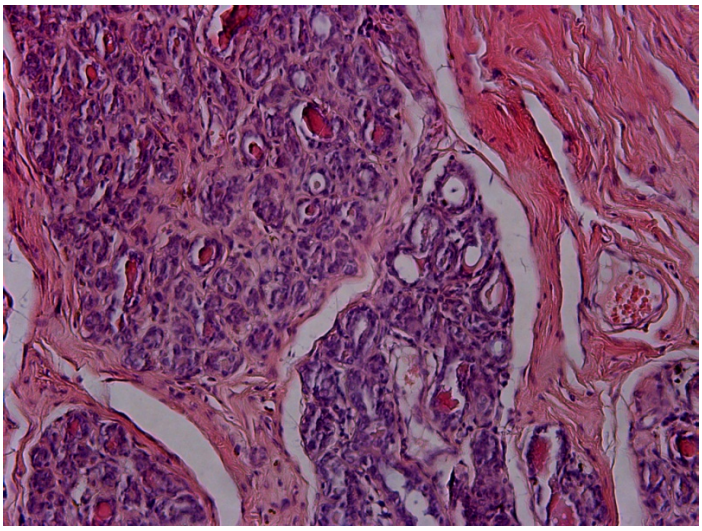
Table 2. demonstrates the histological grade of malignancy(HGM) in different types of canine mammary carcinomas.

Histological type	HGM I	HGM II	HGM III	Total
Complex carcinoma	10	7	3	20
Simple tubulopapillary carcinoma	2	3	2	7
Simple anaplastic carcinoma	7	3	5	15
Spindle cells carcinoma	1	5	1	7
Total	20	18	11	49

Table 2.demonstrates the malignancy grade in different types of canine mammary carcinomas. According to the results from table 2. From total 49 canine mammary carcinomas, 20 or 40.08% were classified with malignancy grade I,18 cases or 36,7% were classified with malignancy grade II,11 cases or 22,4% were classified with malignancy grade III.



Simple tubulopapillary carcinoma X200



Adenoma X 200

DISCUSSION

Results obtained in this investigation in general correspond with the results obtained in others studies, except the percentage of malignant tumors (70%) in this investigation is higher than theirs mean prevalence (50%) Millanta et al.(2007).

The mean age of the bitches when the tumor was removed is 10,5 years, which corresponds with data from literature. Ginn et al.(2007).

Results obtained from analysis due to breeds predisposition show that the most affected breeds are bitches from mixed breeds, German shepherd, poodles, cocker Spaniels etc, which also correspond with data from literature Wey et al.(1999),Moe(2001).

When it comes to proportion between malignant and benign tumors, in our investigation the distribution of malignant tumors of 70% is higher than distribution of 50% that can be found in data from the literature Macewen and Withrow (1996).

Results obtained from classification of canine mammary tumors according to the World Health Organization (WHO),show that complex carcinoma and simple tubulopapillary carcinoma are with the highest prevalence, while spindle cells carcinomas are less prevalent, which in general correspond with data from literature Misdorp et al.(1999),Millanta et al.(2005),Yang et al.(2006).

Sarcom as, carcinosarcomas and particular types of carcinomas which are rare canine mammary tumors, in our investigation weren't present.

When it comes about the malignancy of carcinomas, most of them were with malignancy grade I,which also corresponds with data from literature Millanta et al.(2005), Mertin de las Mulas et al.(2005).

CONCLUSIONS

Based on the results gained from the research of the prevalence and patho-histological classification of the canine mammary tumors from Bitola and Prilep region, we can make the following conclusions:

1. The prevalence of the malignant canine mammary tumors was 70% while the prevalence of the benign tumors was 30%.

2. According to the histological structure, the most prevalent were complex carcinomas and simple tubulopapillary carcinomas whereas spindle cells carcinoma were less prevalent. Mixed carcinomas and sarcomas were absent.

3. According to the grade of malignancy ,the most frequent were carcinomas with malignancy grade I,carcinomas with malignancy grade III were underrepresented.

4. The mean age of the bitches when the tumor was removed was 10.5 years.

5. The most affected were bitches from mixed breeds, poodles, German shepherd and cocker Spaniels.

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