

Optimal Routing in Smart City

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Abstract: For the most people sightseeing is not so simple in an unknown city. Without previous preparations it is almost impossible to explore all the sights. Furthermore only tourist groups can take guided tours. The work intends to put a program in the mobile phone which contains the most significant sights in Székesfehérvár, their history and a short description on the history of the town. Apart from that the application includes a map too, it would be practical for the users to choose a predefined optimal route in the city. With this application it would be easier for the tourists visiting in Székesfehérvár and showing our city.

Keywords: *Székesfehérvár, smart city, sightseeing, routing*

I. INTRODUCTION

For the most people the sightseeing is definitely one of the most beloved free time activities, to see the historical buildings, statues and other interesting places, however, this is not so simple for us in an unknown city. Without previous preparations it is almost impossible to explore all the sights. Furthermore lot of the tourist groups can take guided tours. We intent to put a program in the mobile phone which contains the most significant sights in Székesfehérvár and a description, which has the users introduce to the history of the visited sights, and partly to the history of city. Apart from that the application includes a map too, it would be practical for the users to choose a predefined optimal route in the city. With this application it would be easier for the tourists visiting in Székesfehérvár and showing our city.

Similar installations have already been applied in Hungary too. This is stated in the study, was made by the West Hungarian Scientific Institute, the regional research center of MTA accredited by IBM Magyarország KFT. This study deals with those areas, as for example, intelligent traffic, intelligent city planning, intelligent tourism (like city cards which provide reduces prices) and intelligent electronic administration. The study includes lot of cities like Szeged, Pécs, Győr, Veszprém and e.t.c. [1].

II. HISTORICAL OVERWIVE

Székesfehérvár is the king's town, which was known by the name Alba Regia in the middle ages, is one of our most ancient towns in Hungary. The historical conditions of the area indicated by the fact that the Alba Regia is changed era "Istolni Belgrad", and then "Stuhlweissenburg".



The medieval significance of Székesfehérvár was based by Great Duke Géza, who built the first stone church on the most prominent point in the city centre.

The significant role of the settlement also appeared in King Stephen's state organising work. Stephen, son of Géza, only strengthened the role of Székesfehérvár that began to build in the Royal Basilica for the his family dedicated to Boldogasszony, where her father and he was buried in 1038. Most of the Hungarian king between 1116 and 1540 were buried in the basilica.

Székesfehérvár remained the centre of the Hungarian statehood until the Turk occupation in the 16th century It used to be a tradition to crown the hungarian kings and the city also gave place to the symbols of the royal power, the treasury and the archives of state although during 14th century Buda became the capital of country.

Because of the almost 150 years of Turkish occupation most of the town's historic mementos had been destroyed. In 1601, the fifteen-year war fighting during the events, the castle was recaptured from the Turks in 1602 when the vice captain was Ferenc Wathay ,the siege's master. The rule of the Turkish crescent ceased in 1688. At the same time when renovating and rebuilding works were still in process the town had to carry on a fight against the Austrians to get back its

privileges and rights. The imperial commissioner wielded the actual power over Székesfehérvár until 1703 when the city gained back its former title as a free royal city again [2].



In the 1720s major constructions were started which considerably altered the look of the town. Churches and convents were built. They invited noted contemporary artists to carry out work. The most famous of them was Franz Anton Maulbertsch, who worked on the frescos of the Carmelite Church. Baroque and Louis XVI-style buildings were erected, thus creating the still existing Baroque character of the quarter.

In the 19th century new Classicist buildings were erected. The County Hall, which was designed Mihály Pollack, was one of the first country hall in the Hungary.

In the second half of the 19th century the town once again lost its significance. Its industry languished, and the city council failed to establish a high school in the town. In the early 20th century, big industry was solely represented by a blue-dyeing and calico printing works. The construction of the railway brought some modest economic growth, mainly because Székesfehérvár became a transport centre.

In the 19th century sensation was created by the archeological excavation that revealed Székesfehérvár's past and its role in Hungary's history. The red marble coffins of King Béla III and his wife, Anne of Antioch, were uncovered in 1848, and the excavations in the second half of the 19th century brought to light considerable parts of the basilica. Several burials and ruins were also unearthed.

In the 1930s, Székesfehérvár once again became the centre of attention. The constructions completed in those years gave in the inner city its present appearance. The park of ancient ruins was established and several statues were set up in public places.

Székesfehérvár was one of the towns that suffered most during Word Was Two, but after that an unpa-

ralleled development started in the town. Today Székesfehérvár is considered one of most important industrial town in the country. It has a bustling cultural life, theatre with permanent company, the musicians and choirs further it has a lot museum, exhibition halls and collections. The exhibitions of the King Stephen Museum are countrywide well known. In the last time Székesfehérvár has become town of schools. Alongside secondary grammar schools and vocation secondary schools Székesfehérvár has a college and two university faculties.

Székesfehérvár, as we see, has as great a significance today as it had in the Middle Ages. Walking in the centre of Székesfehérvár you can sense the unique atmosphere of the town even more nowadays [3].

III. SELECTION OF SIGHTS

In Székesfehérvár about 150 listed buildings and 50 important sculptures and lot of the other sights can be seen.

NODES	INSIDE SIGTHS
1.	City Council - Pátzay's sculpture „The No.10 Hussars”- Orb
2.	Episcopal Palace
3.	Franciscan Church (Városház tér)- Memorial Plaque of St. Emericus
4.	Hiemer House - Monument of Second Word War
5.	Turkish court
6.	Town Wall- Palota Gate- Bory's Bishop Fountain
7.	Lépeső utca (Baroque corner house))
8.	The episcopal cathedral (Church of St. Peter and Paul)- Chapel - and sculpture of Grand Duke Géza
9.	St. Anne Chapel - the figure of Humanist provost Domonkos Kálmánchehi
10.	Budenz House (Ybl Collection)
11.	Old County Council (New Hungarian Art Gallery)
12.	County Council - House-row of St. Stephen's square
13.	Vörösmarty tér - Ybl's Houses- Vörösmarty statue
14.	Carmelite Church with frescos of Maulbertsch
15.	Pelikán Inn (Kossuth utca)
16.	Árpád Baths
17.	Medgyesy's sculpture – Memorial of Unknown Soldier – Clock-game
18.	The park of ancient ruins, excavation of the royal basilica
19.	Bastion of the monastery - sculpture of poet Wathay - Memorial monument of bishop Prohászka
20.	Church of st. John of Nepomuk - old monastery (King Stephen Museum) - Monument of King Mathias
21.	„Fekete Sas” (Black Eagle) Pharmacy
22.	Sculpture of György Varkocs
23.	Vörösmarty Theatre
24.	Hotel Magyar Király (Hungarian King)
25.	Library Vörösmarty Mihály
26.	Old grammar school - Memorial Plaques
27.	No 10 Jókai utca (City Gallery)
28.	No 6. Jókai utca (medieval house)

The most significant objects of those were chosen, namely 25 buildings, 13 sculptures and 15 other's. From them 43 objects in the inner city (inside sights) and 11 objects (outside sights) in the suburbs are placed. The objects seeing from the same place were sum up nodes. In this way 28 nodes in the city and 11 nodes in the other places were formed.

NODES	OUTSIDE SIGTHS
A.	Bory Castle
B.	Monument of Gold Bull
C.	Millennium Monument
D.	Serbian Church, village museum
E.	Royal Fountain
F.	Csitári Fountain,
G.	Cross-road (Palotai út)
H.	Prohászka Memorial Church
I.	St. Sebastian Church
J.	Railway Station

A description and photo(s) were made on the objects being found in the objects, which have appeared on the phone as text as speech in Hungarian and in English (optional). As example the No.1 node is shown as follows

No.1. (City Council - Pátzay's sculpture „The No.10 Hussars”- Orb

Today's Városház tér, one of the town's most attractive, has always been the main square of Székesfehérvár. In the centre is Orb, which symbolizes the significance of the town in the Middle Ages. It was erected in 1943 by Béla Ohmann. Three data can be seen on Orb these played the great role in the history of the town, further an epitaph: *Libertates Civitatis Albensis a S. rege Stephano concessae*, means Liberties of Fehérvár were donated by St. Stephen King.



The most important building is the double houses of City Council. The right side wing is the older which was erected in the 1690s. It's gate is decorated by sculptures of Justitia (Justice) and Prudentia (Wisdom) made by Thomas Wlach in 1718. The left side is the later, the former Zichy palace was built in 1781 in copf style. An attractive part of that is the iron made balcony of style XVI Luis on the front from Kossuth utca. The corner

balcony of the City Council removed from the Biebauer House in 1936-37. The latter house was later pulled down and the Zichy palace was expanded and obtained its recent form. The wall of the council room is decorated by painting of Béla Kontuly „King Andrew II issues the Gold Bull on székesfehérvárian parliament in 1222”. An other painting on the corridor from William Aba Novák figures the participants of parliament in 1938.



At the west corner of the City Council The Memorial Monument of „The No.10 Hussars” by Pál Patzay can be found. The monument is one of the most important works of the sculpture between the two word war [4].



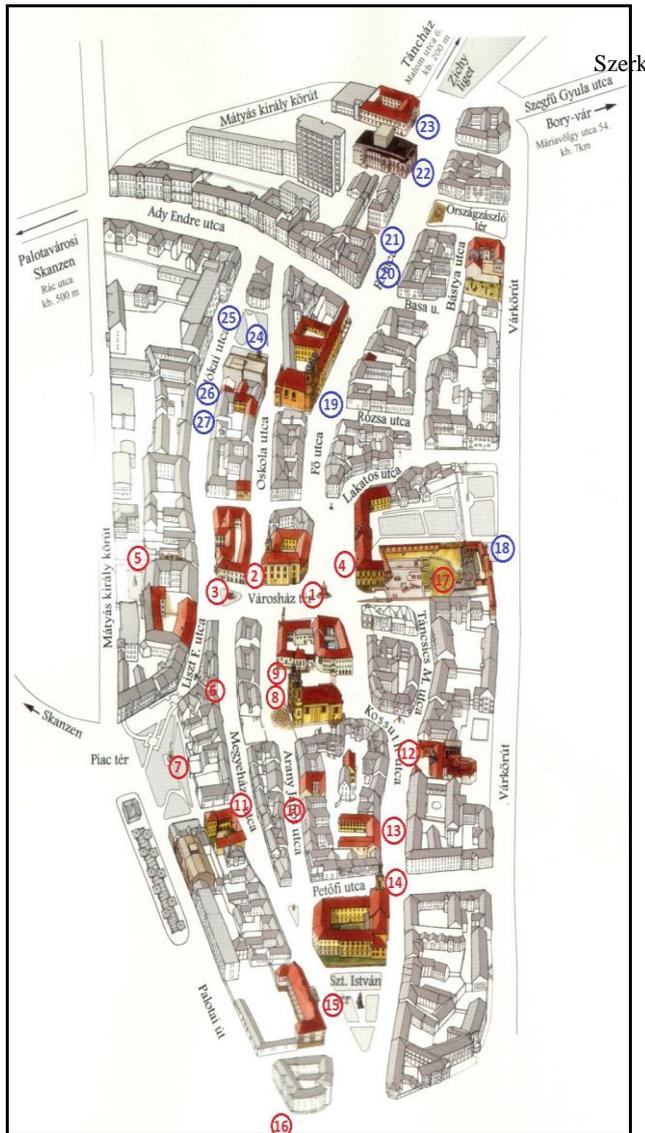
IV. DETERMINATION OF OPTIMAL ROUTING

Sights of the city (1-28) are placed on a relative small area (about half square kilometre) and can be walked during four hours. A part of the visitors sometimes have shorter time for the sightseeing, therefore the sights were divided into two parts, namely

- North City (1-5 and 17-28),
- South City (1-18).

To the outside sights, as those are separately placed, routes are not planned.

The total route has a „8” formed, which can be divided into two „circle form” routes.



The first viewpoint of the routing plan was to minimize those, therefore, starting from the No.1 node, the all possible route were constructed for both circles and those having the minimal lengths has been chosen (See the map).

Besides of the fixed routes so called „free routes” were planed, the visitor walks in the city and when has

neared to the object, the information appears on the phone.

There is possibility to choose an object from the list (in case of outside sights there is no possibility). The visitor chooses the in question object, the phone lead him to that by GPS.

REFERENCES

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