

# Approximate Solutions to the Food Selection Problem (or How to Pig Out in the Eternal City)

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## Abstract

In this paper, we consider a variety of selection problems that typically arise in Rome around VII<sup>1</sup> PM (and later). The typical questions that we will try to answer can be exemplified as follows:

- Where can I have dinner tonight?
- What is the typical Roman cuisine that I should (not) miss?
- Where can I find the best coffee or gelato in town?

Since such problems are notoriously hard, they are not expected to be solvable in polynomial time (even by naive enumeration strategies). We therefore design simple constant time approximation algorithms for food selection based on well known algorithmic techniques such as random sampling, divide et impera, local search, hill climbing, and the greedy approach. A preliminary experimental investigation done by the authors suggests that our algorithms achieve very good approximation ratios. We leave the theoretical proof of this conjecture as an open problem for the interested eater.

**Keywords:** *Carciofi alla giudia, bucatini alla gricia, coratella d'abbacchio, fiori di zucca, mozzarella di bufala, rigatoni alla pajata, bucatini all'amatriciana, spaghetti alla carbonara, saltimbocca alla romana, spaghetti cacio e pepe, trippa alla romana.*

## I Introduction

Eating is one of life's greatest pleasures, especially in Rome. Thus, the general advice recommends foreigners to be adventurous and to follow the well-known maxim:

*When in Rome, do as the Romans do.*

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<sup>1</sup>Throughout this paper, some numbers will be in Roman.

Unfortunately, previous experimental evidence suggests that this approach may not even lead to a feasible solution in finite time due to convergence problems. Indeed, there is an incredible variety of eateries, especially in districts such as *Testaccio*, *Trastevere*, *Campo de' Fiori*, *Piazza Navona* or the *Ghetto*. The problem of selecting a good restaurant seems therefore of practical importance in this mouth-watering scenario.

In this paper we present practical algorithms for the food selection problem. Our algorithms are based on fundamental algorithmic techniques including random sampling, divide et impera (sorry guys, but we are in Rome!), local search, hill climbing, and the greedy approach, and require only constant time. However, since every month is high season for tourism in Rome, if you don't plan in advance you may be forced to use backtracking (the restaurant may be full or closed): this occurrence could considerably increase your running time.

## II Local search

Well, it's VII PM and FOCS sessions are over. You feel so hungry that even expander graphs look like fettuccine. Local search seems the appropriate technique to apply in this case. Like any good Roman district, you will not be spared by the wealth of great restaurants, trattorias and pizzerias around the FOCS venue. We propose a simple local search algorithm based on the constant-size lookup table below. All the solutions can be easily reached on foot (in XV minutes or so, depending on hunger pangs) even if you don't like walking or if you are not very good at computing shortest paths: see Figure I.

R1 *La Baita*, Via V. Veneto 2, ph: 06-4882212

R2 *Le Bistrot d'Hubert*, Via Sardegna 135/137, ph: 06-42013161, closed on sunday

R3 *A Casa di Alice*, spaghetteria, V. Bergamo 34, ph: 06-8549737. Hundreds of different spaghetti dishes!

R4 *Al Chianti*, Via Ancona 17/19, Porta Pia, ph: 06-44250242

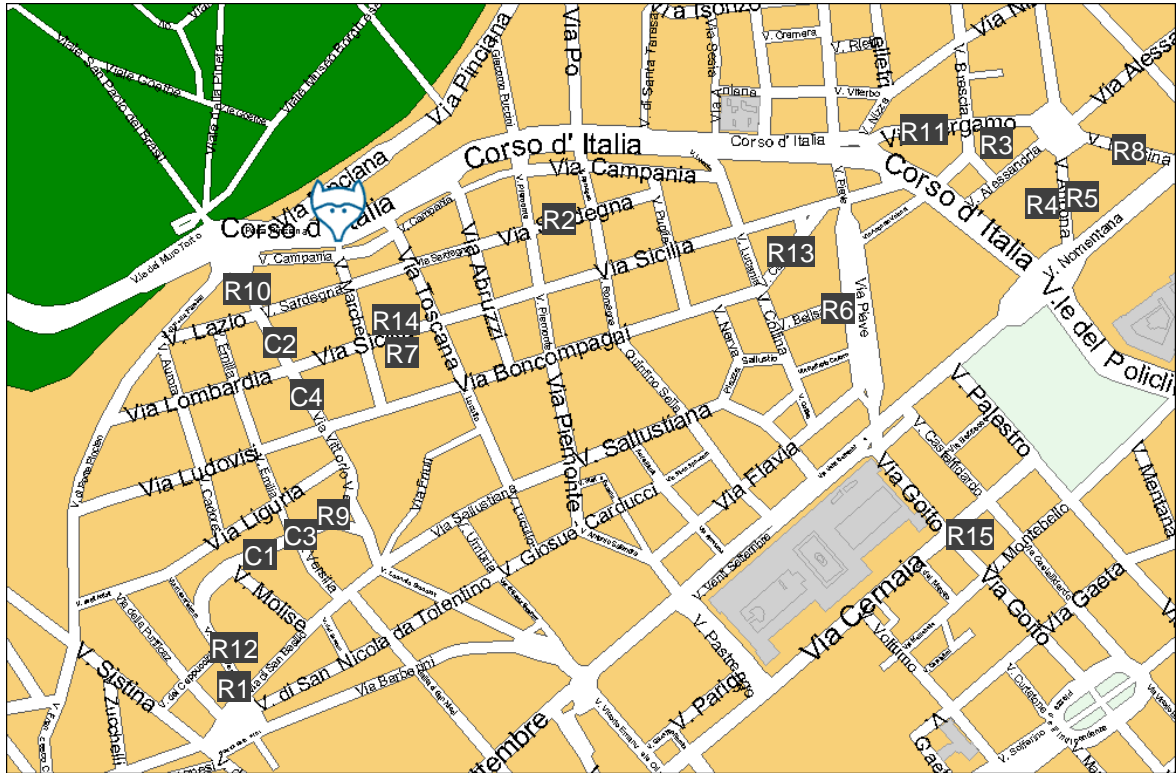


Figure I. Food selection by local search.

R5 *Ristorante Coriolano*, Via Ancona 14, ph: 06-44249863

R6 *Al Forno della Soffitta*, Via Piave 62/64, ph: 06-42011164. good pizza

R7 *Ristorante Girarrosto Fiorentino*, Via Sicilia 46, ph: 06-42880660

R8 *Grattaleone*, Via Messina 42, ph: 06-44242379

R9 *Hard Rock Cafè*, Via V. Veneto 62/a, ph: 06-4203051, if you don't like your FOCS T-shirt, you might get another one here

R10 *Harry's*, Via V. Veneto 150, ph: 06-4742103, expensive

R11 *La Maremma*, Pinciano, Via Bergamo 16, ph: 06-8414136, pizzeria

R12 *Pastarito*, Via V. Veneto 13, ph: 06/42014860

R13 *La Pecora Nera*, Via Calabria 21/31, ph: 06-42826069, closed on Sunday

R14 *Ai Rugantini*, Via Sicilia 66, ph: 06-42020409

R15 *Trimani*, Wine Bar, Via Cernaia 37/b, ph: 06-4469630, closed on Sunday

The following cafes and bars are good places to have a snack:

C1 *Cafè de Paris*, Via V. Veneto 91, ph: 06-4815631

C2 *Cafè Veneto Asador*, Via V. Veneto 116, ph: 06-4827107

C3 *Cafè delle Nazioni*, Via V. Veneto 97, ph: 06-4884592

C4 *Doney*, Via V. Veneto 125, ph: 06-47082805

### III Hill climbing

Hill climbing appears to be a very promising approach: to understand why, let's review a little bit of history on the VII Hills of Rome. Tradition says that Rome was founded in DCCLIII (753) BC by twin boys, Romulus and Remus. Romulus and Remus were abandoned by their parents, put in a cradle and sent off to be drowned on the Tiber river. The boys were found by a she-wolf who took care of them as if they were her own cubs. (We remark that all of this happened well before Mowgli appeared.) When the boys grew a bit older, a shepherd found them: he and his wife raised them to be young men. At that point, the twins set out on a quest: on their way they found a beautiful land with

seven hills, which they named Palatine (Palatino), Aventine (Aventino), Capitoline (Campidoglio), Quirinal (Quirinale), Viminal (Viminale), Esquiline (Esquilino) and Caelian (Caelio). They were very excited: but, who would rule that piece of land? In order to determine this, Romulus stood on the Aventine hill and Remus stood on the Palatine: which ever hill the birds flew over, that brother would rule the land. It was said to be a message from the gods. After a long time, six birds flew over the Palatine hill where Remus was standing, and so he thought he would rule, until twelve birds flew over the Aventine hill where Romulus stood, and Romulus ended up ruling Rome.

Nowadays, the seven hills, the valleys in-between, and some other hills such as Janiculum (Gianicolo, rising above Trastevere) and Pincian (Pincio, rising above Piazza del Popolo) represent just the central part of the city (Centro Storico), in which you will find the main monuments, archeology sites, wonderful views, museums, and fine restaurants. But don't be scared about climbing Rome's hills: they aren't that big after all! Some restaurants and trattorias in central Rome are listed below.

- R16 *Antico arco*, Gianicolo, Piazzale Aurelio 7, ph: 06-5815274, closed on Sunday (A2)
- R17 *Arancia blu*, San Lorenzo, via dei Latini 55-65, ph: 06-4454105, vegetarian (east of C2)
- R18 *Da Armando al Pantheon*, Centro Storico – Pantheon, salita de' Crescenzi 31, ph: 06-68803034, closed on Sunday (B2)
- R19 *Da Benito e Gilberto*, Vaticano, via del Falco 19, ph: 06-6867769, closed on Sunday/Monday, very good fish (A1)
- R20 *Cafè Mancini*, Centro Storico – Campo Marzio, via Metastasio 21, ph: 06-6872051, closed on Sunday, once in the centre, reach it by walking along some of the most characteristics streets in Rome (B2)
- R21 *La Campana*, Centro Storico – Campo Marzio, vicolo della Campana 18, ph: 06-6867820, closed on Monday, some people say this is the most ancient restaurant in Rome... (B2)
- R22 *Camponeschi*, Centro Storico – Campo De' Fiori, Piazza Farnese 50/50a, ph: 06-6874927, closed on Sunday, historical Roman restaurant in a wonderful location, expensive (A2)
- R23 *Checchino dal 1887*, Testaccio, Via di Monte Testaccio 30, ph: 06-5743816, closed on Sunday/Monday, another historical Roman restaurant (A3)
- R24 *Checco Er Carrettiere*, Trastevere, Via Benedetta 10, ph: 06-5800985, closed on Sunday (A3)
- R25 *Il Convivio*, Centro Storico – Navona, Vicolo dei Soldati 31, ph: 06-6869432, closed on Sunday, very good restaurant, expensive (A2)
- R26 *Dar Cordaro*, Trastevere, Piazzale Portuense 4, ph: 06-5836751, closed on Sunday/Monday (A3)
- R27 *Il Drappo*, Centro Storico – Campo De' Fiori, Vicolo del Malpasso 9, ph: 06-6877365, closed on Sunday, Sardinian cuisine (A2)
- R28 *Gaudì*, Parioli, Via R. Giovannelli 8, ph: 06-8845451, pizza (north of C1)
- R29 *Da Giggetto al Portico d'Ottavia*, Antico Ghetto, Via Del Portico d' Ottavia 21/a , ph: 06-6861105, closed on Monday (B2)
- R30 *Hostaria degli Artisti*, Esquilino, Via G. Sommeiller 6/8, ph: 06-7018148, Neapolitan cuisine (C2)
- R31 *Matricianella*, Centro Storico – Campo Marzio, via del Leone 2/4, ph: 06-6832100, closed on Sunday, authentic Roman cuisine at convenient prices (B2)
- R32 *La Penna d'Oca*, Centro Storico – Popolo, via della Penna 53, ph: 06-3202898, closed on Sunday, for hard to please gourmets (B1)
- R33 *Dar Poeta*, Trastevere, Vicolo del Bologna 45, ph: 06-5880516, very good pizza (A3)
- R34 *Sora Lella*, Centro Storico – Isola Tiberina, Via di Ponte Quattro Capi 16, ph: 06-6861601, famous restaurant in a position unique in the world (B2)
- R35 *Tram Tram*, San Lorenzo, Via dei Reti 44, ph: 06-490416 (east of C2)
- R36 *Il Tulipano Nero*, Trastevere, Via Roma Libera 15, ph: 06-5818309, good pasta and pizza (A3)

In spite of the restaurants above, you might still want to try international cuisine:

- I1 *Hang Zhou*, Esquilino, Via San Martino ai Monti 33c, ph: 06-4872732, Chinese (C2)
- I2 *Isola Puket*, Quartiere Africano, Via di Villa Chigi 91, ph: 06-86212664, Thai (north of C1, just in front of Pino Italiano's house!)
- I3 *Jaipur*, Trastevere, Via San Francesco a Ripa 56, ph: 06-5803992, the best Indian restaurant in town (A3)
- I4 *Rokko*, Centro Storico – Tritone, Via Rasella 138, ph: 06-4881214, Japanese (B1)
- I5 *Thien Kim*, Centro Storico – Campo De' Fiori, Via Giulia 201, ph: 06-68307832, Vietnamese (A2)

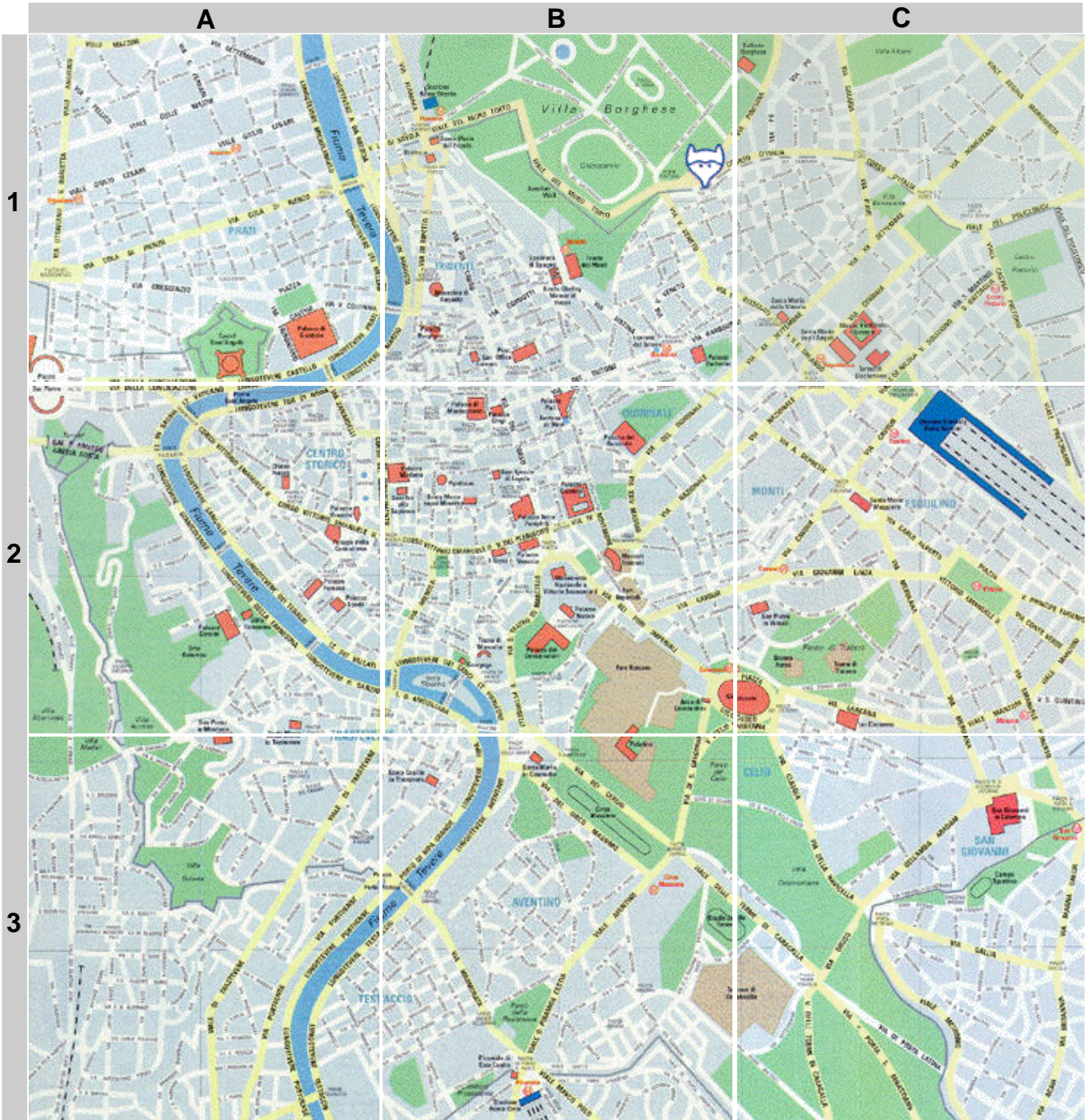


Figure II. Geometrical decomposition used by our divide et impera food selection algorithm (see Section IV).

A1	Prati - San Pietro - Castel Sant'Angelo - Vaticano
A2	Piazza Navona - Piazza Farnese - Campo De' Fiori Via Giulia - Gianicolo
A3	Trastevere - Testaccio
B1	FOCS 2004 venue, Piazza del Popolo - Villa Borghese Piazza di Spagna - Via Veneto - Via Condotti - Tritone
B2	Quirinale - Fontana di Trevi - Fori Imperiali - Mercati Traianei Foro Romano - Piazza Venezia - Campidoglio - Pantheon Via del Corso - Isola Tiberina - Campo Marzio - Antico Ghetto
B3	Aventino - Circo Massimo - Bocca della Verità Piramide Cestia - Porta San Paolo
C1	Villa Albani - Via XX Settembre - Porta Pia Galleria Borghese - Terme di Diocleziano
C2	Stazione Termini - Santa Maria Maggiore - Via Nazionale Via Cavour - San Pietro in Vincoli - Piazza Vittorio Colosseo - San Clemente - Domus Aurea - Esquilino
C3	San Giovanni - Terme di Caracalla - Porta Latina

Figure III. Lookup table used in the geometric approach of Section IV.

### III.i Corollaries

After lunch or dinner, you can have a tasty gelato in one of the following celebrated “gelaterie”:

G1 *Il Gelato di San Crispino*, Centro Storico – Tritone, Via Della Panetteria 42, ph: 06-6793924, closed on Tuesday (B1)

G2 *Al Settimo Cielo*, Prati, Via Vodice 21a, ph: 06-3725567, closed on Monday (A1)

G3 *Giolitti*, Via Degli Uffici del Vicario 40, ph: 06-6991243 (B2)

... or you can drink a coffee at the following cafes (but please, remember, you are not supposed to order a cappuccino in Italy after noon!):

C5 *Caffè Sant'Eustachio*, Centro Storico – Pantheon, Piazza Sant'Eustachio 82, one of the best places to taste real Arabian Coffee. Try the caffè speciale, granita, irish cream, or parfait (B2)

C6 *Ciampini*, Centro Storico – Campo Marzio, via della Fontanella di Borghese 59 / Piazza San Lorenzo in Lucina 29 (B2)

## IV Divide et Impera (Divide and Conquer)

Well, you know that Rome wasn't built in a day, and when the input size gets large, divide et impera can yield good results. To apply the technique, divide the map of Rome into IX squares having approximately the same area, as shown in Figure II. Based on your taste and preferences,

choose an area where you would like to have dinner (e.g., area B2) and find the corresponding entry in the lookup table given in Figure III. Scan the list of restaurants of Section III, discarding those not located in any of the areas listed in the selected lookup table entry. Choose a restaurant among the remaining ones: if the list of remaining restaurants is empty (don't panic: this is a low probability event), return “Error # MCCLXXIX: Diet suggested”.

## V Random sampling

If you choose a restaurant uniformly at random from the lists given in Section II and in Section III, you can still expect a reasonably good solution.

## VI The greedy approach

If you want to try authentic Roman cuisine, look for the following dishes when you order (especially in traditional restaurants such as “trattorie” and “osterie”). A short guide can be probably helpful in order to get oriented:

**Carciofi alla Giudia:** Roman-Jewish style artichokes, a must! You can have them in many Kosher restaurants in the Ghetto.

**Bucatini alla gricia, spaghetti cacio e pepe:** different kinds of pasta topped with grated pecorino Romano, ground black pepper, olive oil. Pasta alla gricia also contains cured bacon (pancetta).

**Abbacchio alla scottadito, abbacchio al forno:** “burned finger” lamb, roasted lamb.



Figure IV. A satisfied reader of this paper.

**Filetti di baccalà:** deep fried cod.

**Fiori di zucca:** courgette flowers, typically stuffed with mozzarella and anchovies.

**Bucatini all'amatriciana:** pasta topped with tomato sauce, pancetta and a touch of black pepper.

**Spaghetti alla carbonara:** pasta topped with egg, parmesan cheese, pancetta and black pepper.

**Saltimbocca alla romana:** "JumpInMouth" Roman style, a thin fillet of veal topped with a slice of cured ham, white wine and sage.

And now, these are for the really adventurous people:

**Trippla alla romana:** tripe Roman style.

**Rigatoni alla pajata:** pasta made with young veal calf intestines.

**Coda alla vaccinara:** stewed oxtail.

Among other Italian foods that are worth trying, we also recommend:

**Appetizers:** bruschetta, crostini, supplì, mozzarella di bufala, olive ascolane, antipasto all'italiana.

**Main courses:** tortellini or ravioli with meat (ringlets of dough filled with seasoned minced meat, typical from Bologna), trofie al pesto (a special recipe from Genoa), fettuccine<sup>2</sup> alla boscaiola (fettuccine with mushrooms and peas), spaghetti alle vongole (pasta with clams).

**Desserts:** tiramisù ("PickMeUp", with coffee and mascarpone, an Italian soft cheese), cannoli or cassata siciliana (Sicilian pastry filled with cream and buttermilk curd), babà napoletani (Neapolitan sponge-cake steeped in rum syrup), torta della nonna (grandma's cake, typically with cream and pine seeds).

<sup>2</sup>We refer the interested eater to Appendix I for details about the famous Fettuccine Alfredo.

## VII Concluding remarks

We have surveyed the main algorithmic techniques that can be used to solve a variety of food selection problems, designing practical algorithms that can be easily implemented to run in constant time. According to a preliminary experimental study done by the authors, our algorithms appear to achieve very good approximation ratios: the typical outcome of the experiments is exemplified in Figure IV. And to conclude, Horatius would say:

*Nunc est bibendum,  
nunc pede libero pulsanda tellus*

"Now it is the time to drink, now it is the time for the loose feet to hit the floor" (Horatius, Carmina 1, 37).

## Appendix I

Wanna know the real story behind Fettuccine Alfredo? In MCMXIV (1914) a small restaurateur living above his small Rome restaurant was faced with a problem no respectable Roman could endure: the loss of his wife's appetite. Many months pregnant, Alfredo di Lelio's wife refused all her husband's best dishes. Watching his wife grow weaker, Alfredo made a vow: "I'll invent something so tasty that she will immediately succumb to temptation," remembers Russell Bellanca, co-owner of the U.S. branches of Alfredo the Original of Rome. So late one night in his tiny kitchen, Alfredo dropped a handful of fresh fettuccine egg noodles into a pot of boiling water. He melted butter and Parmegiano Reggiano cheese, and then he mixed in the pasta. Fettuccine Alfredo was born! His wife cleaned her plate, and a short time later, Alfredo II was born to the music of customers downstairs in Alfredo's I's restaurant, all crying for his new irresistible dish. Today, of course, the original Alfredo's in Rome, which is in Piazza Augusto Imperatore, is lorded over by Alfredo the III. Amazingly enough, nowadays fettuccine Alfredo are more known in the U.S. than in Rome: there are branches of Alfredo's in Manhattan and Miami Beach, as well as in Disney World's Epcot Center.

